

FIG. 1A

400540.0000

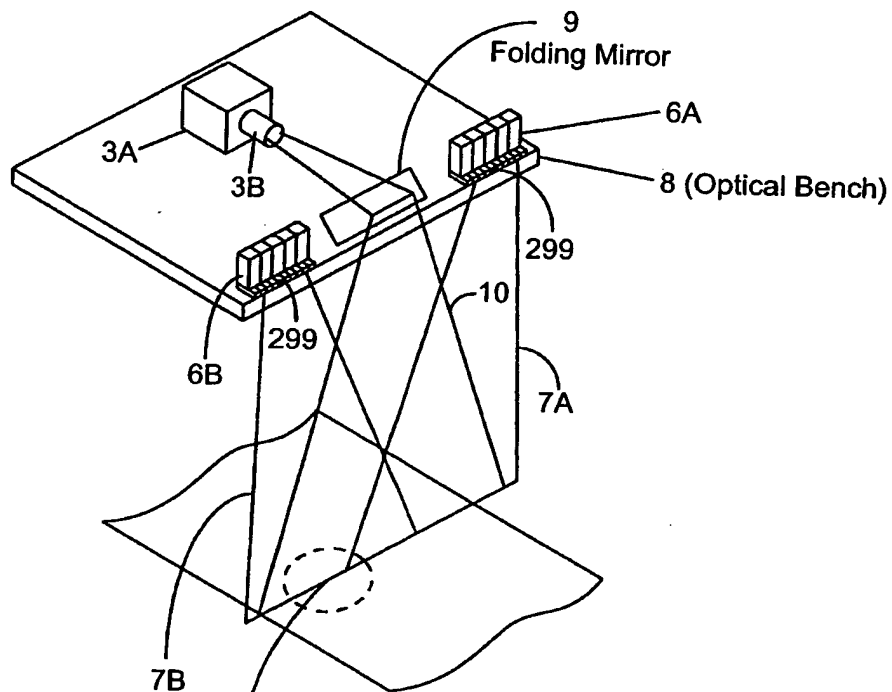
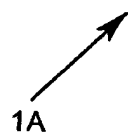


FIG. 1B1



Magnified Field of View of CCD
sensor element on object

Width of projected Planar
Laser Illumination Beam
on object

FIG. 1B3

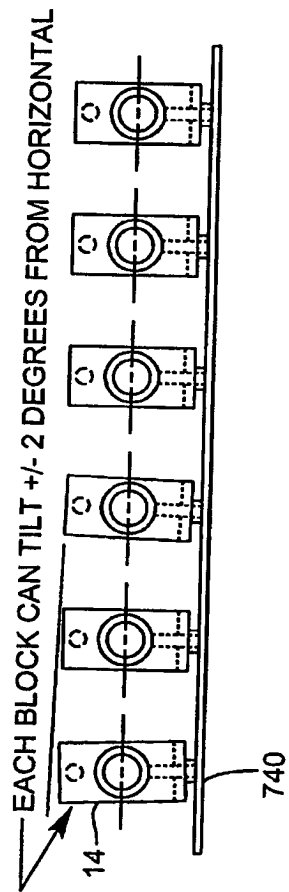


FIG. 1B4

VLD BLOCK CAN PITCH FORWARD FOR ALIGNMENT WITH OTHER VLD BEAMS

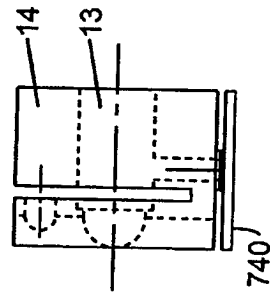


FIG. 1B5

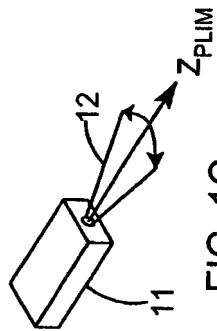


FIG. 1C

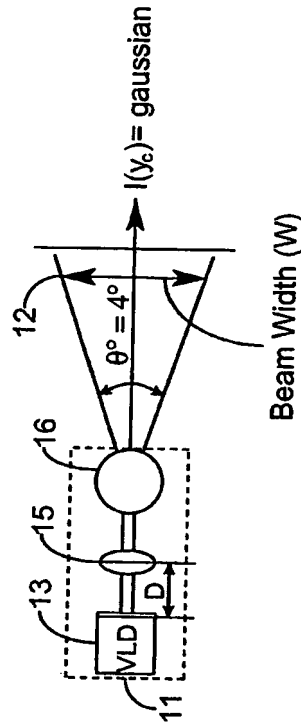


FIG. 1E1

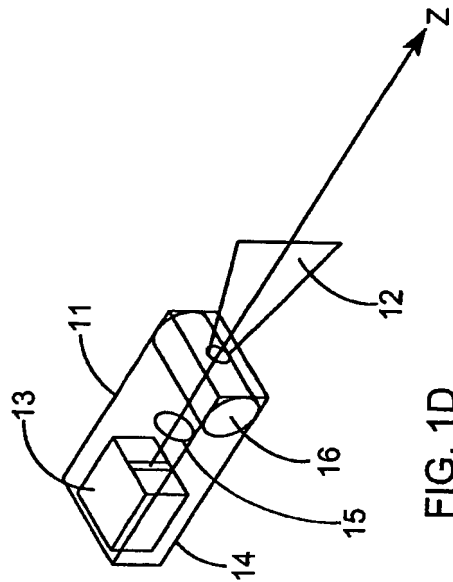


FIG. 1D

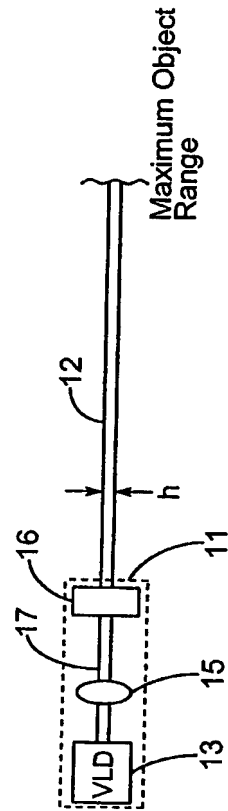


FIG. 1E2

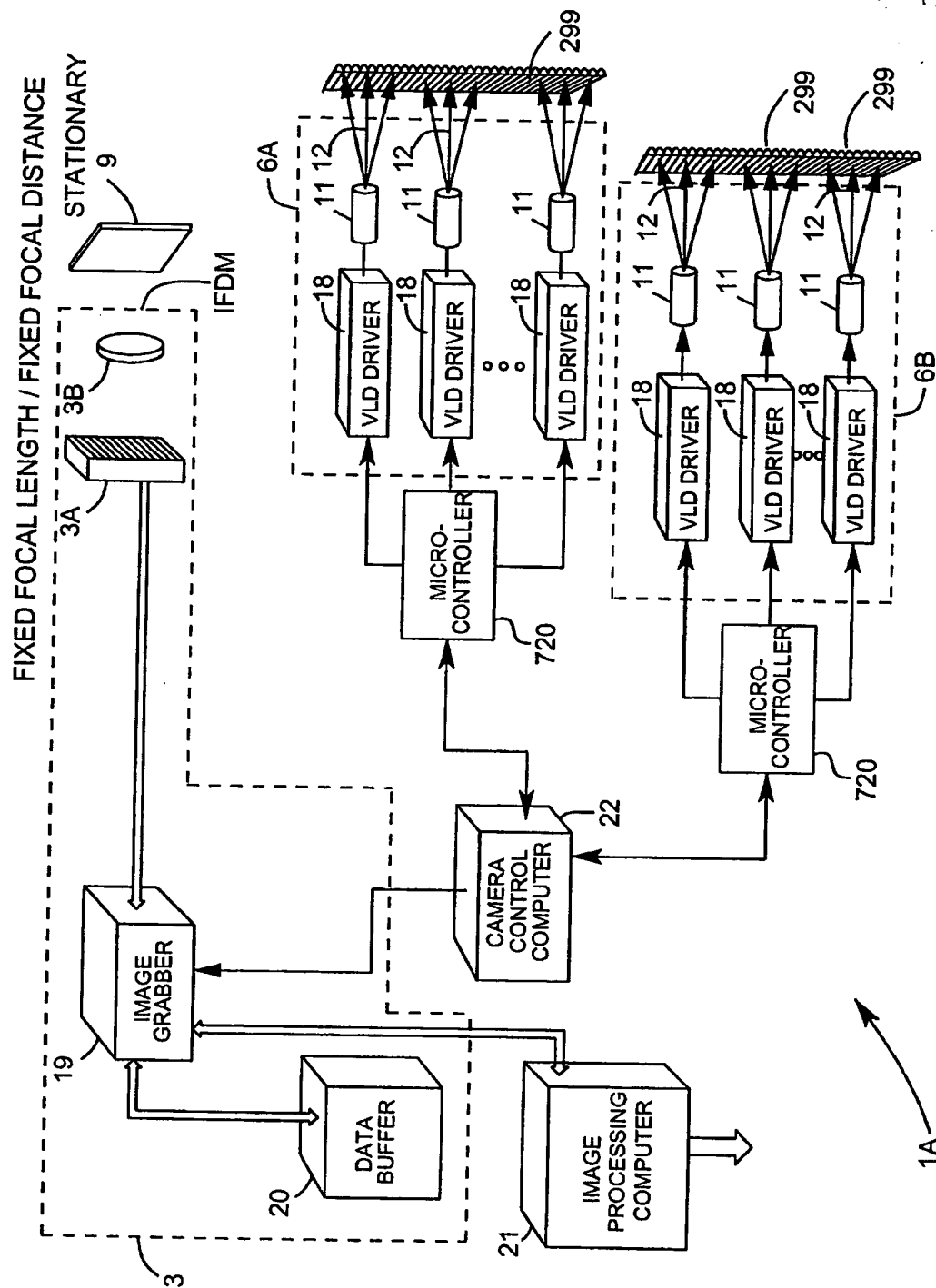


FIG. 1F

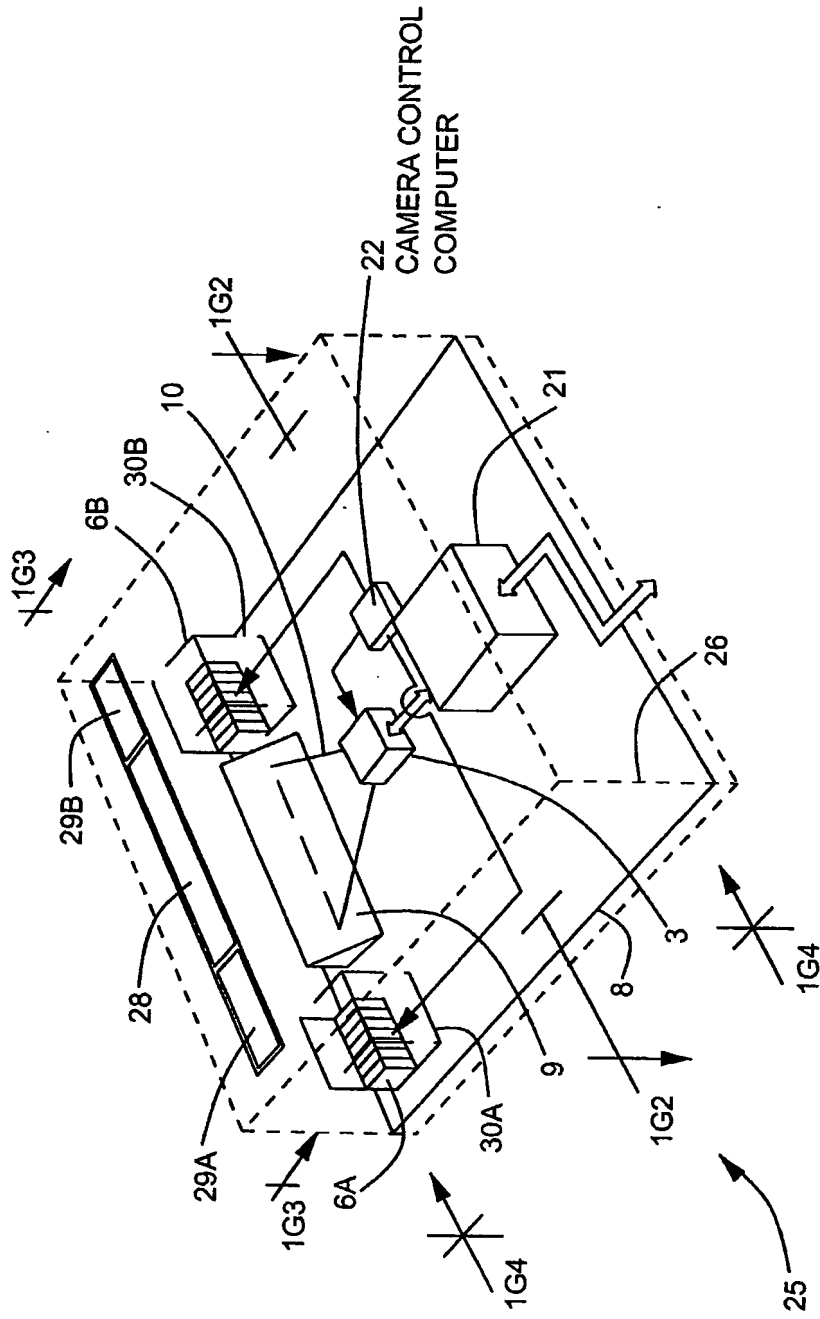


FIG. 1G1

20000107 04529007

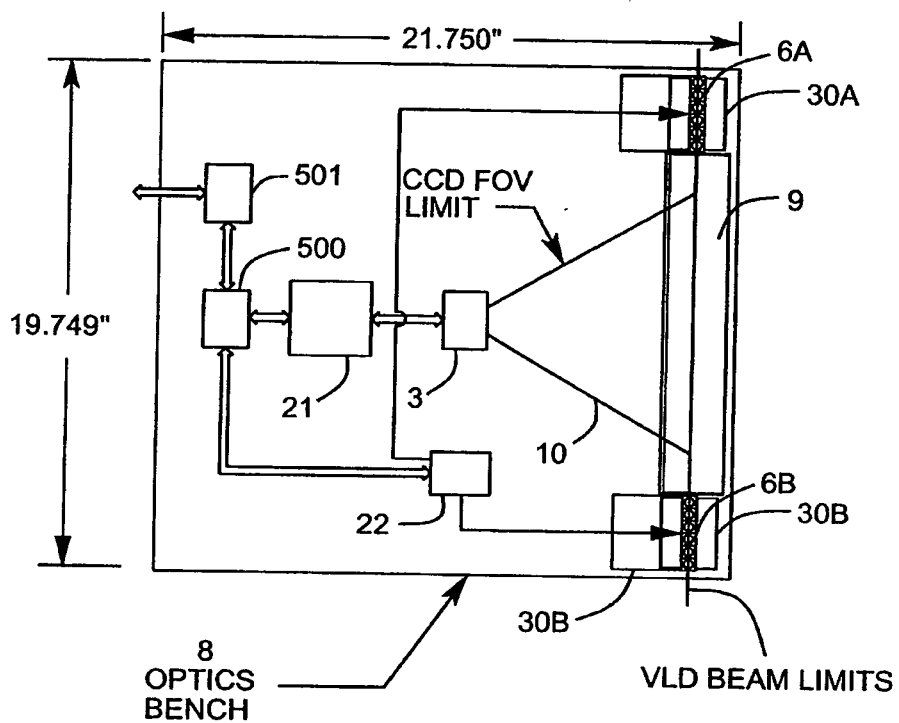


FIG. 1G2

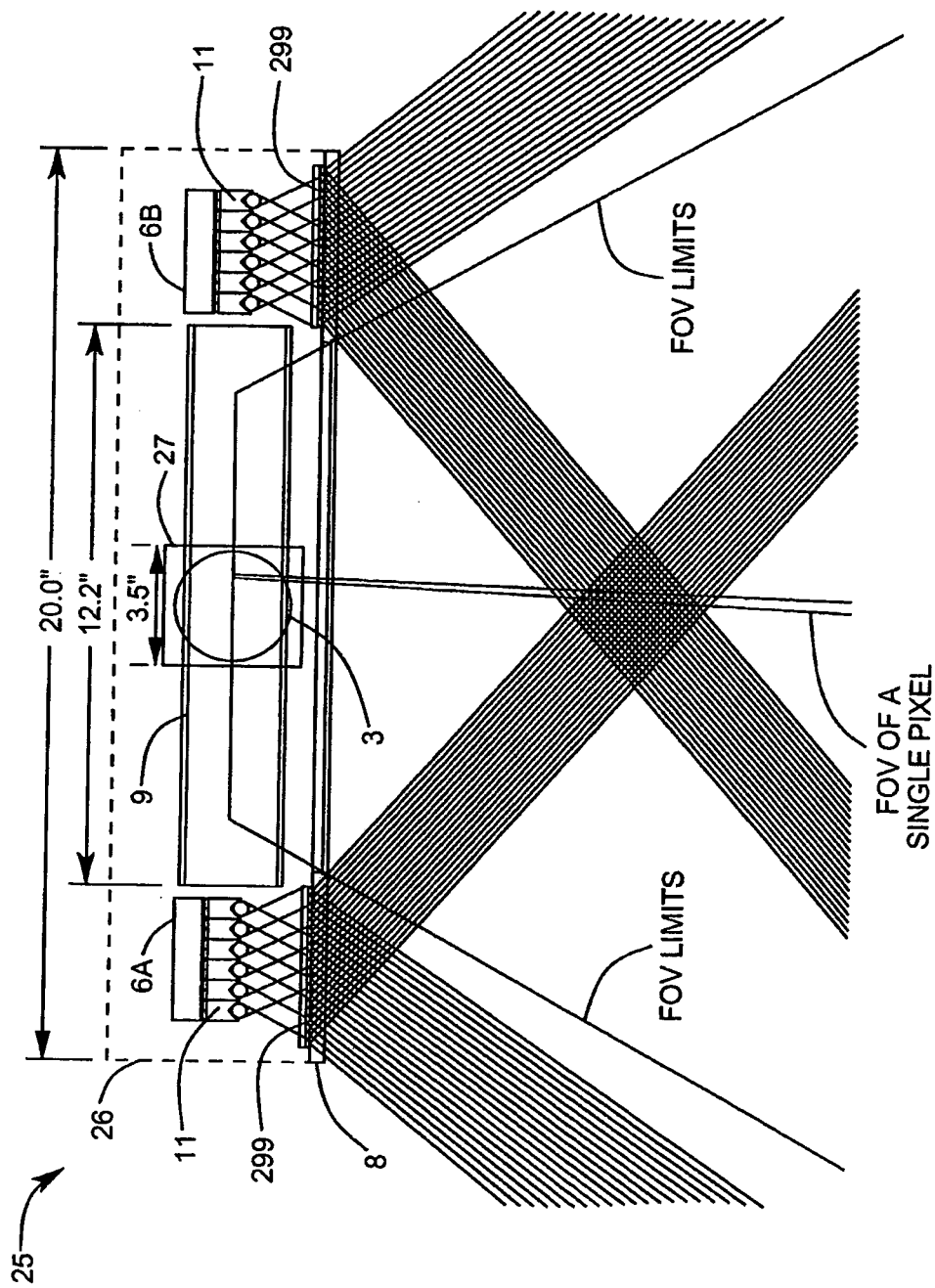


FIG. 1G3

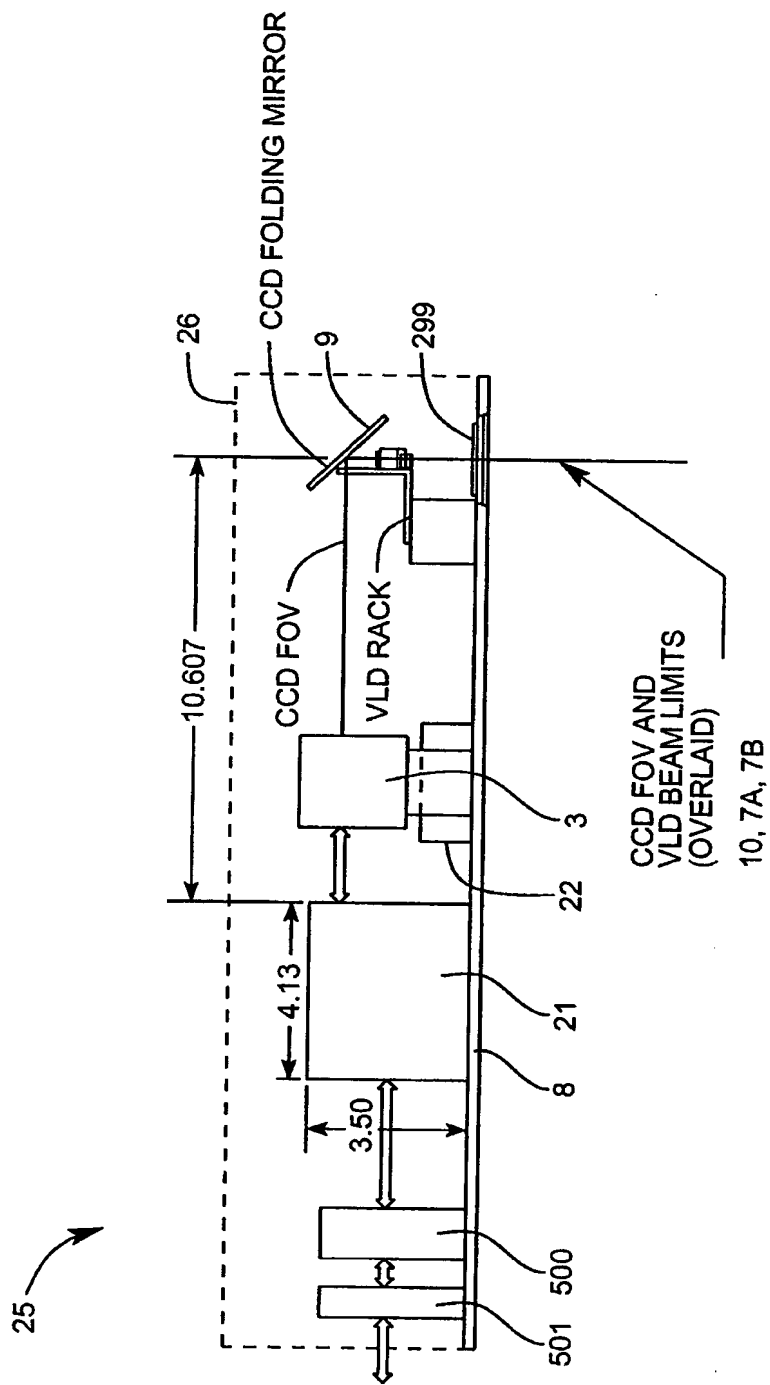


FIG. 1G4

206020 04929007

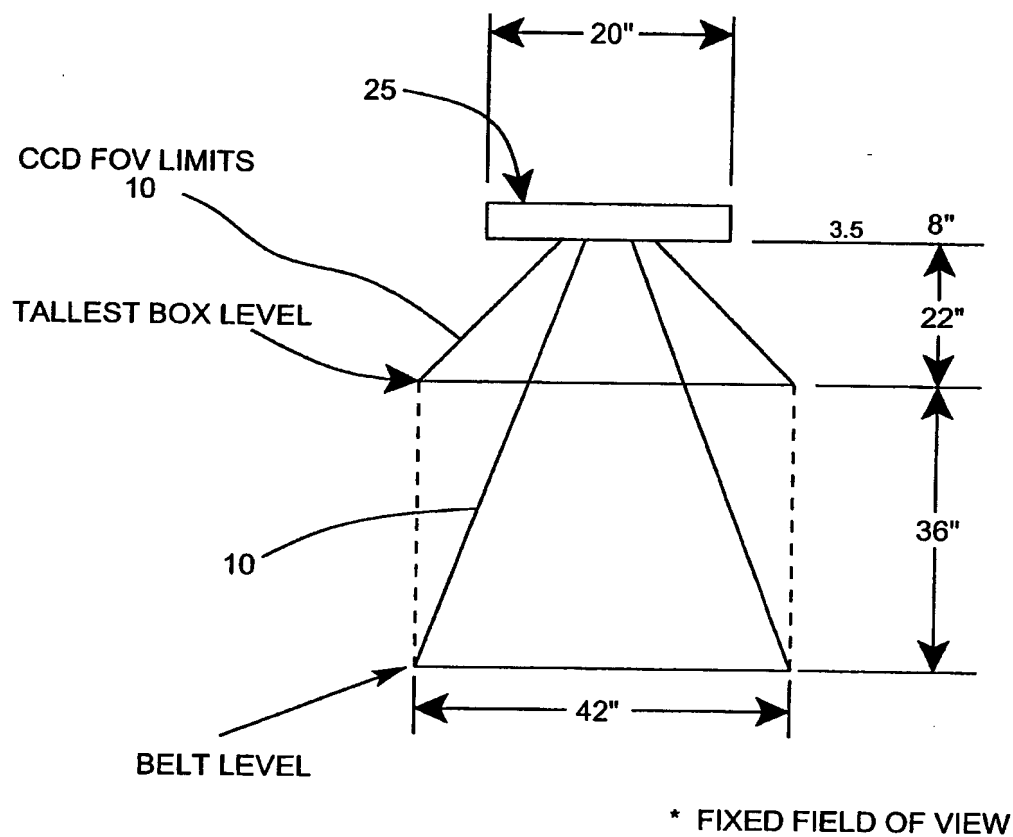


FIG. 1G5

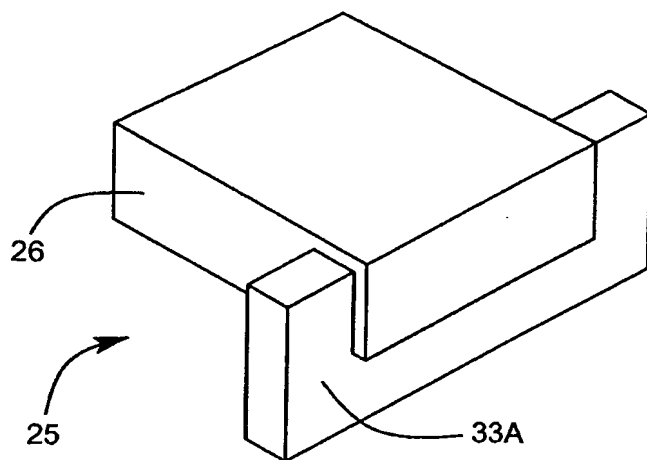


FIG. 1G6

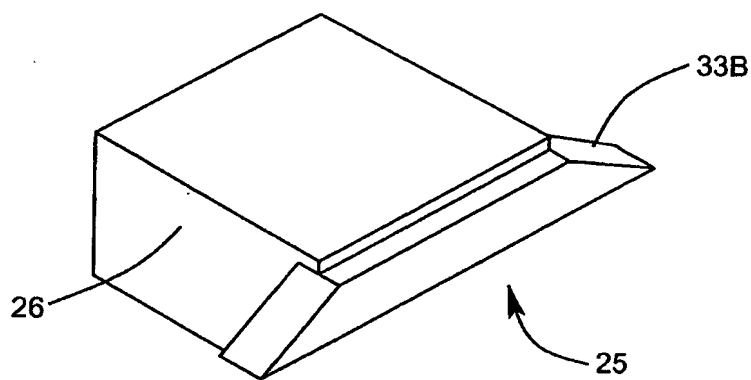


FIG. 1G7

4063540.070902

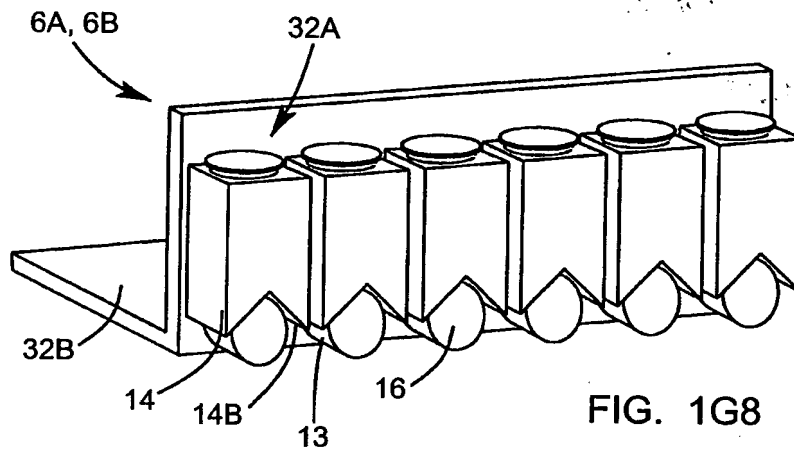


FIG. 1G8

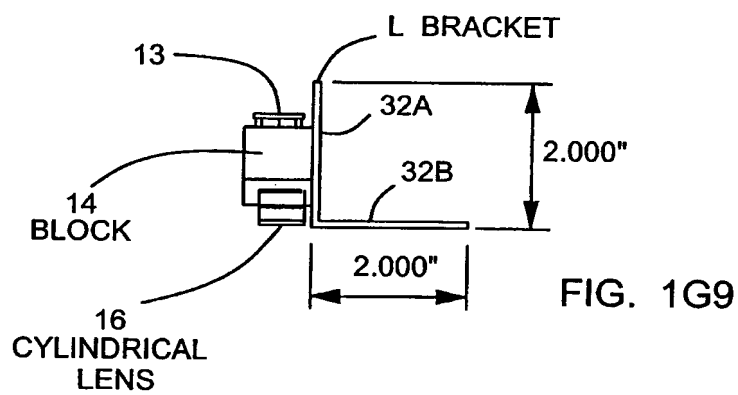


FIG. 1G9

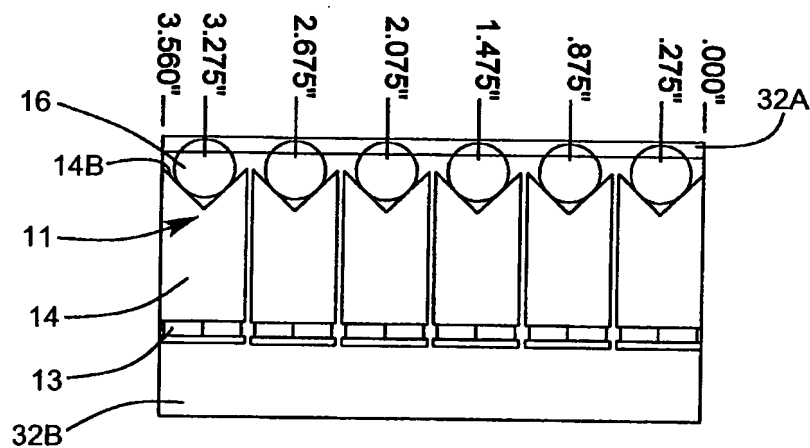


FIG. 1G10

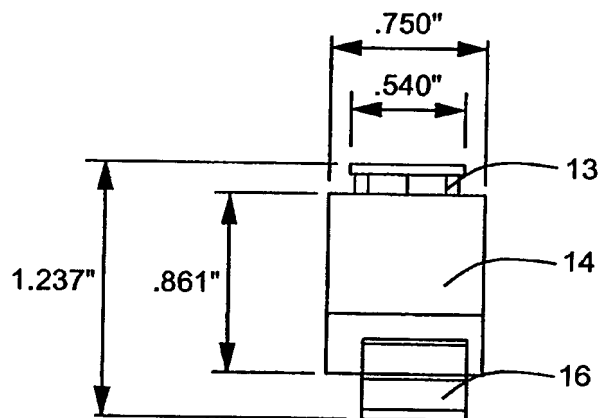


FIG. 1G11

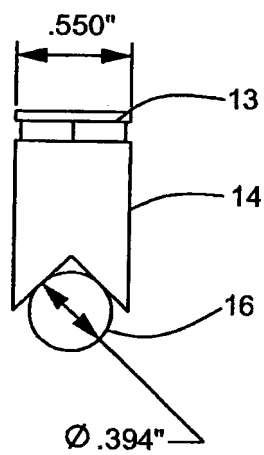


FIG. 1G12

20250701 04525007

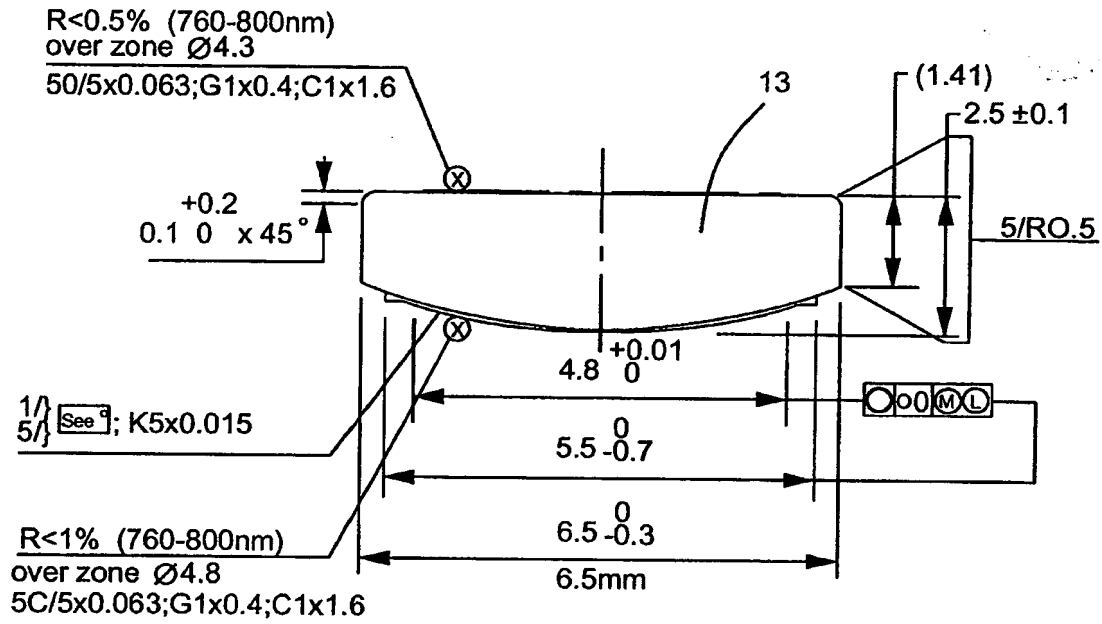


FIG. 1G13

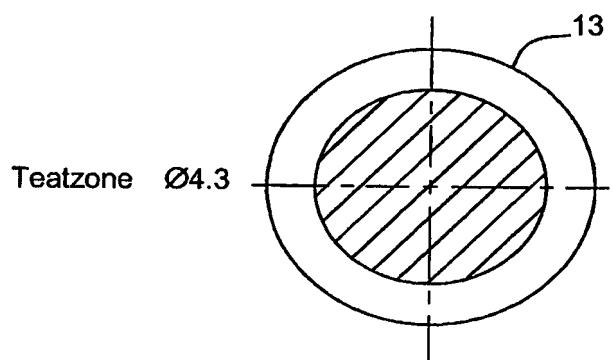


FIG. 1G14

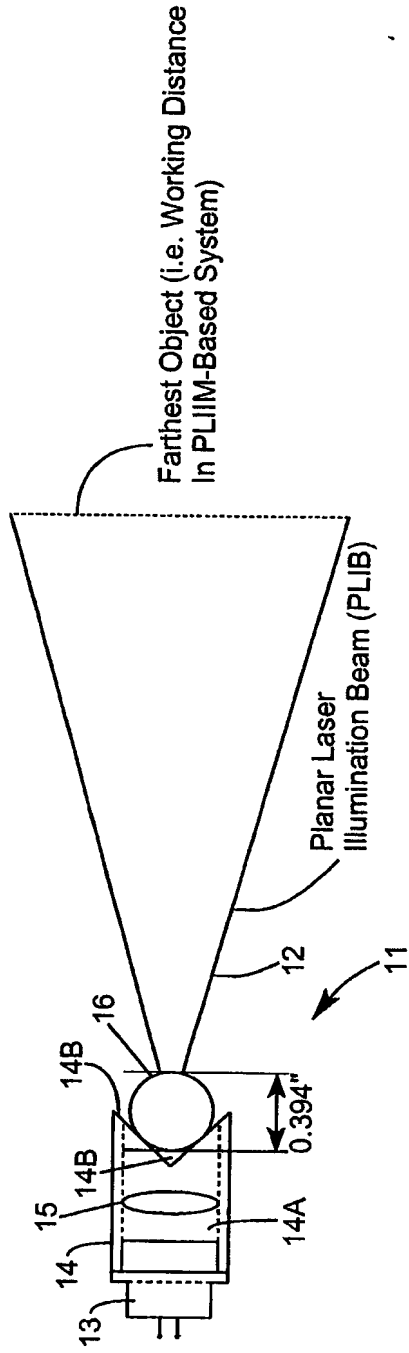


FIG. 1G15A

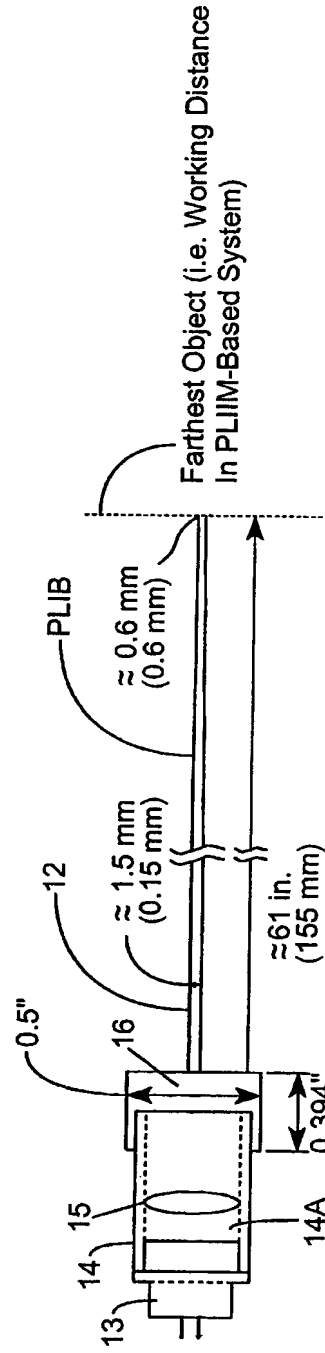


FIG. 1G15B

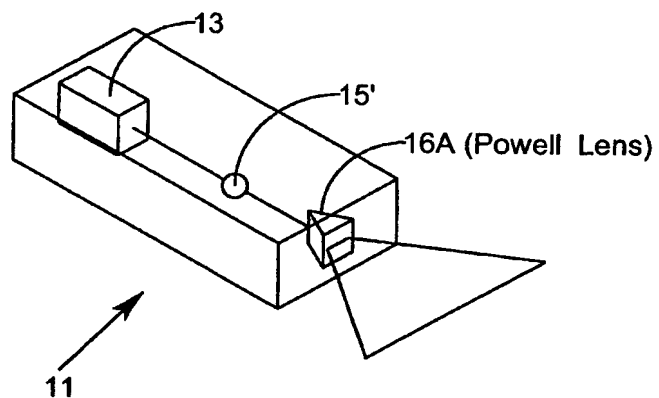


FIG. 1G16A

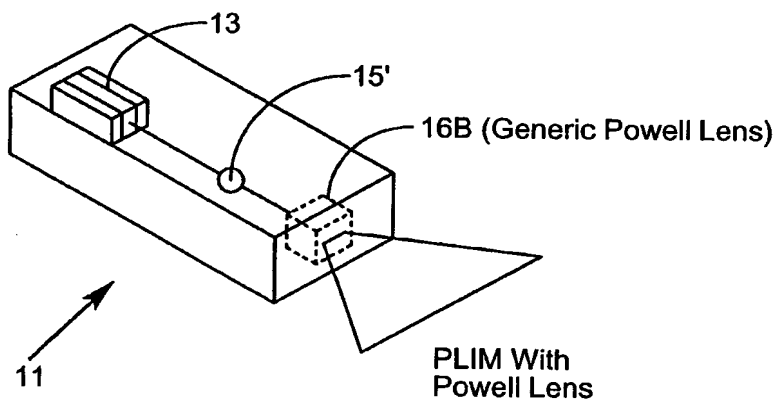


FIG. 1G16B

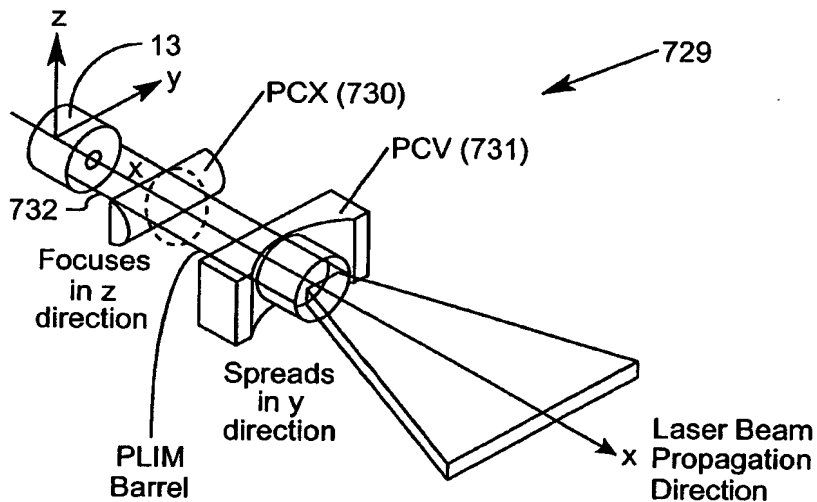


FIG. 1G17A

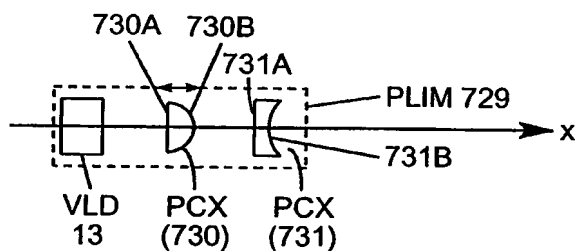


FIG. 1G17B

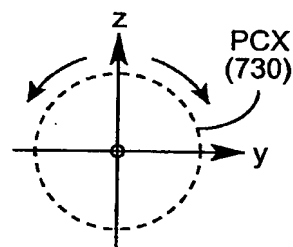


FIG. 1G17C

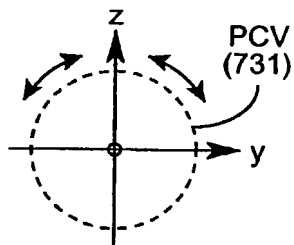


FIG. 1G17D

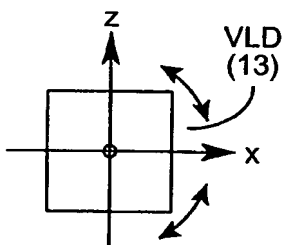


FIG. 1G17E

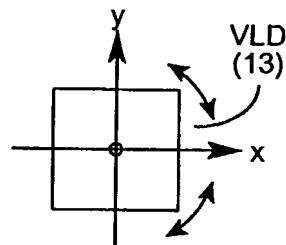


FIG. 1G17F

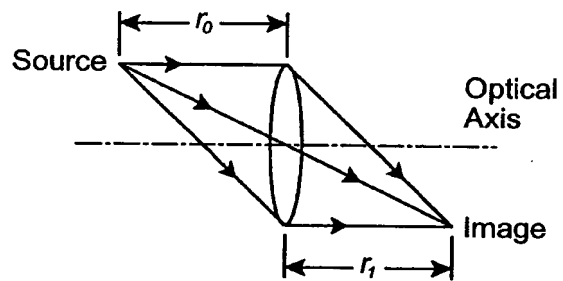


FIG. 1H1

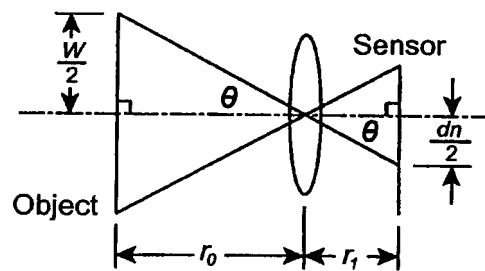


FIG. 1H2

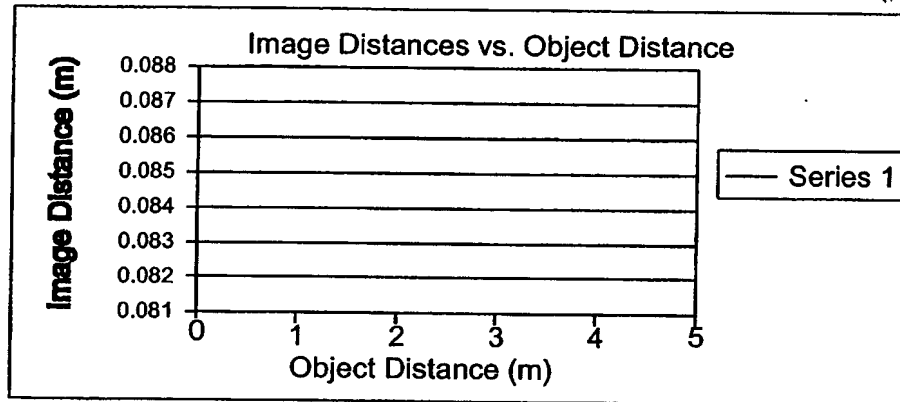


FIG. 1H3

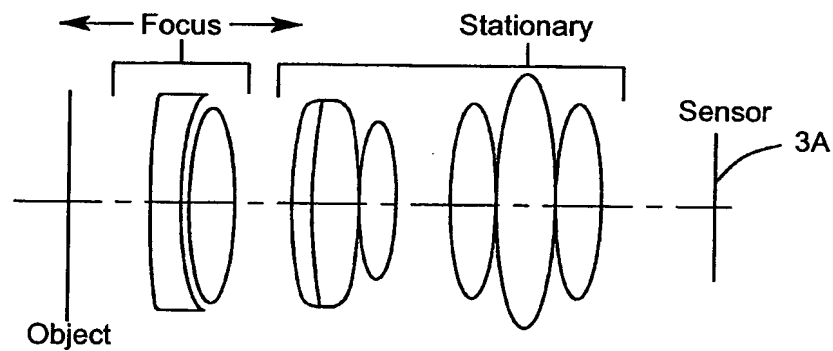


FIG. 1H4

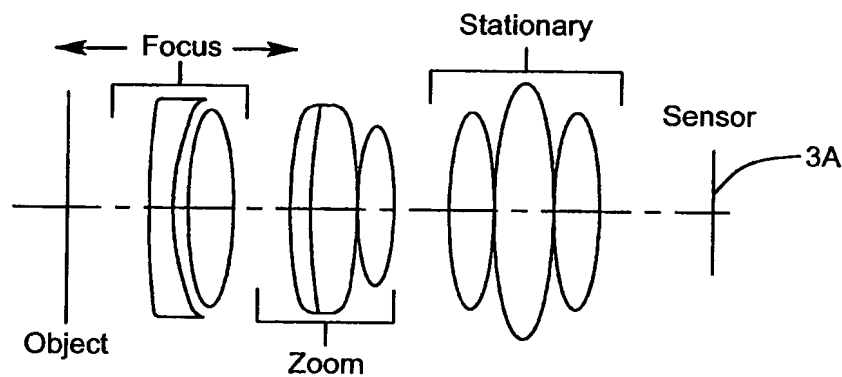


FIG. 1H5

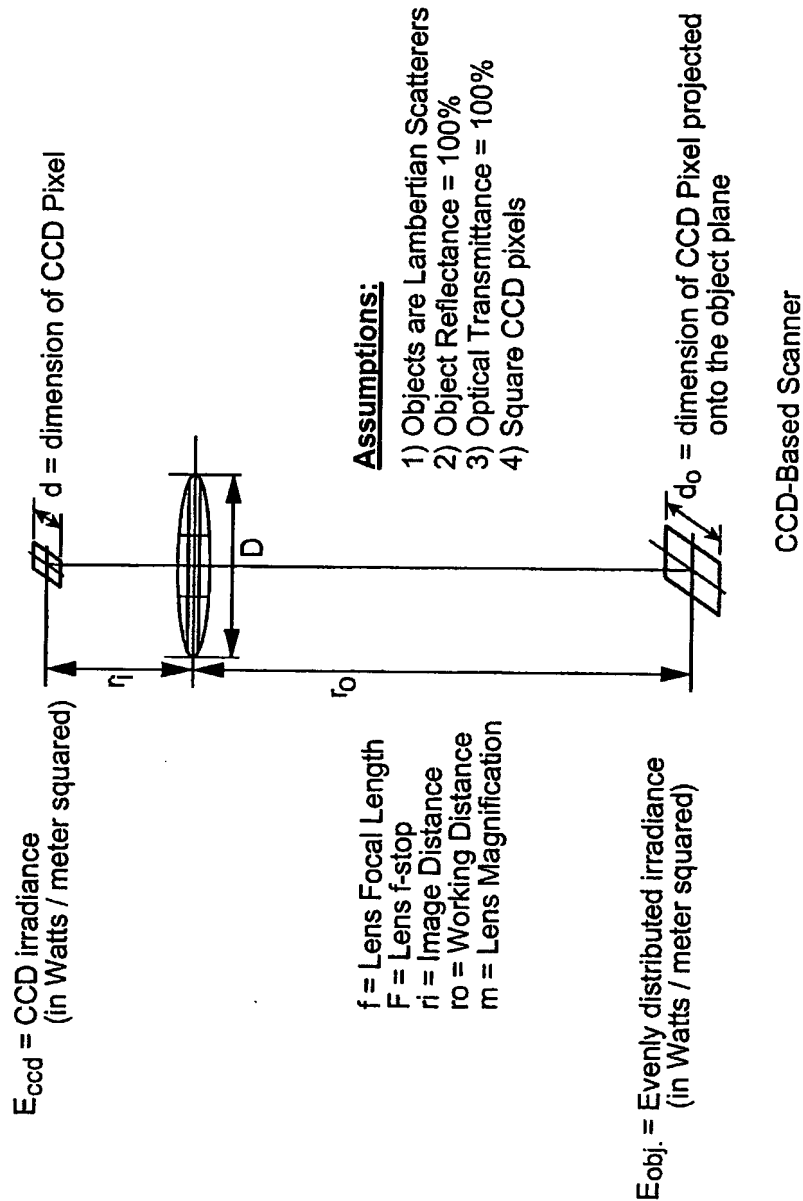


FIG. 1H6

FIRST GENERALIZED METHOD OF REDUCING
SPECKLE-NOISE PATTERNS AT IMAGE DETECTION
ARRAY OF THE IFD SUBSYSTEM (3)

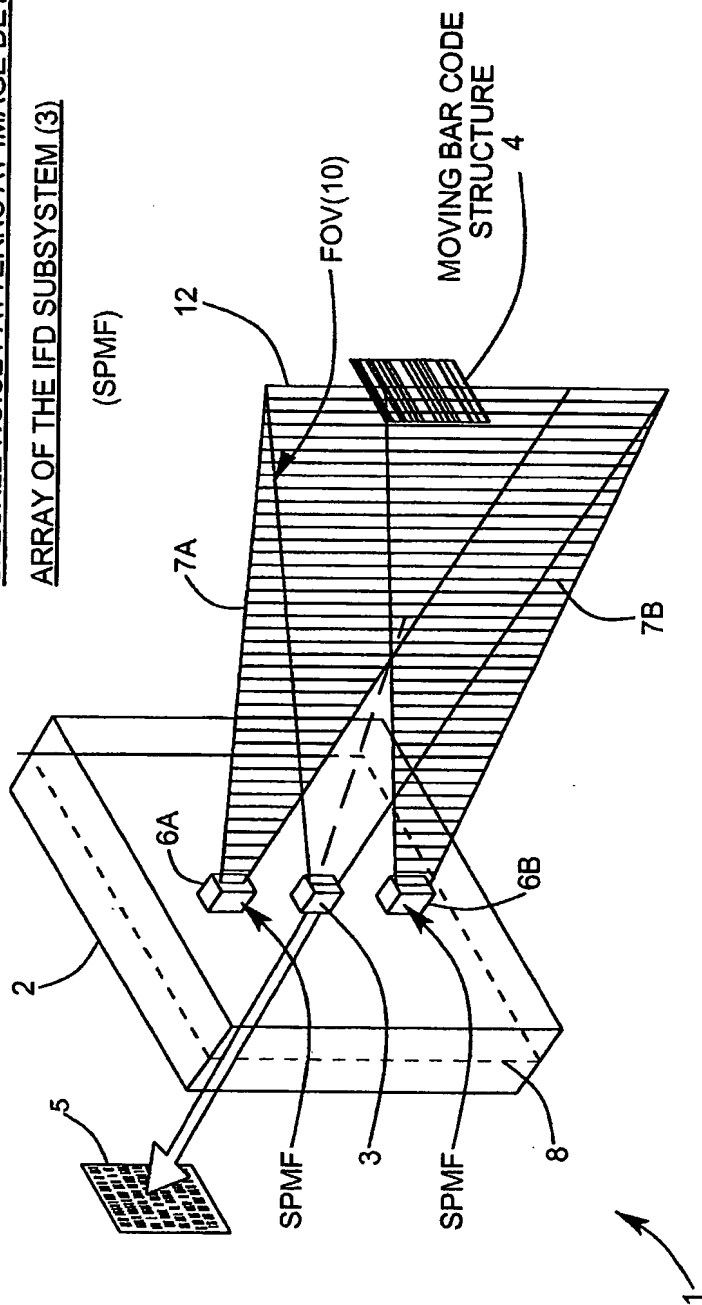


FIG. 111

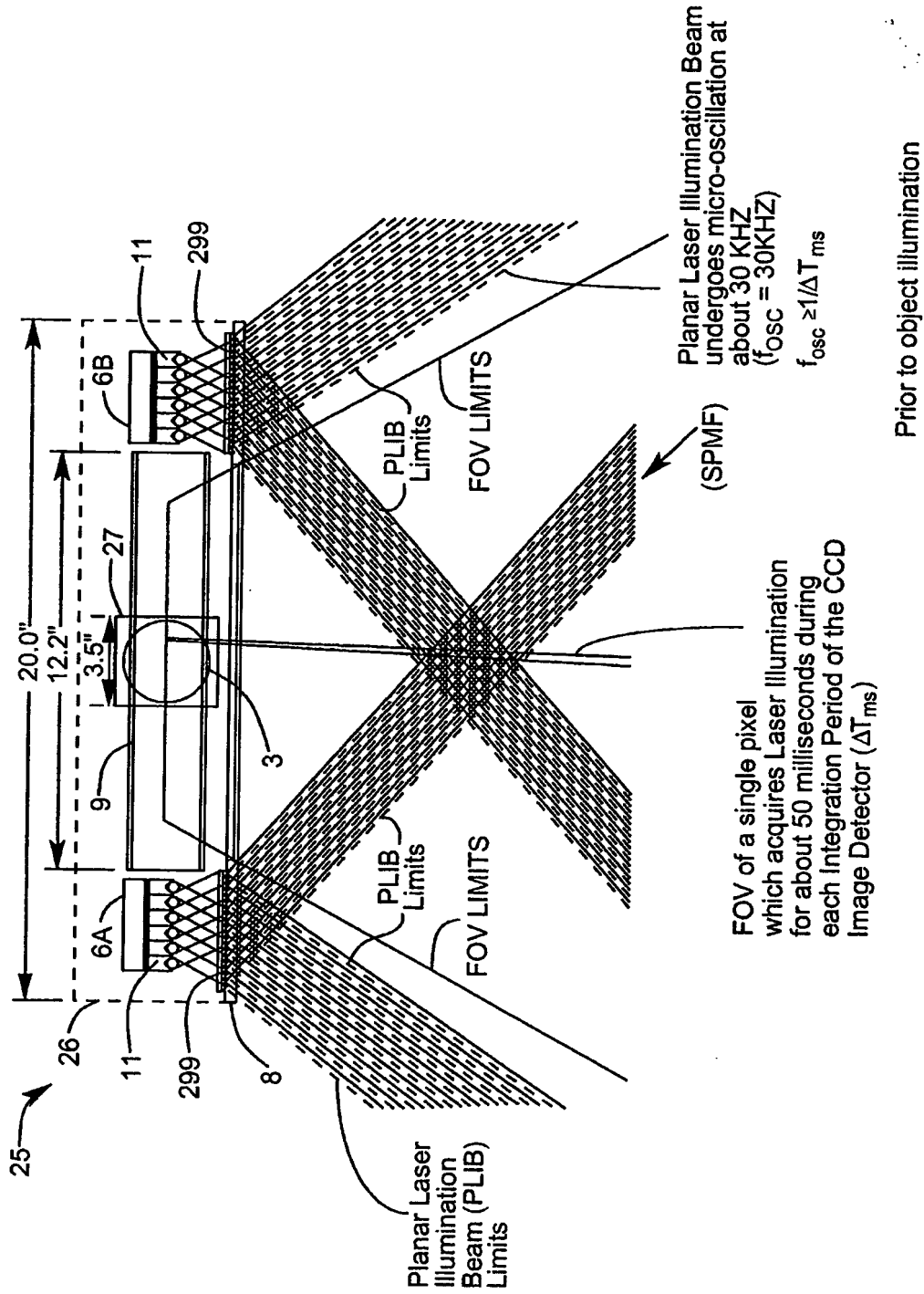


FIG. 112A

20060409 04525001

THE FIRST GENERALIZED SPECKLE-NOISE PATTERN REDUCTION
METHOD OF THE PRESENT INVENTION

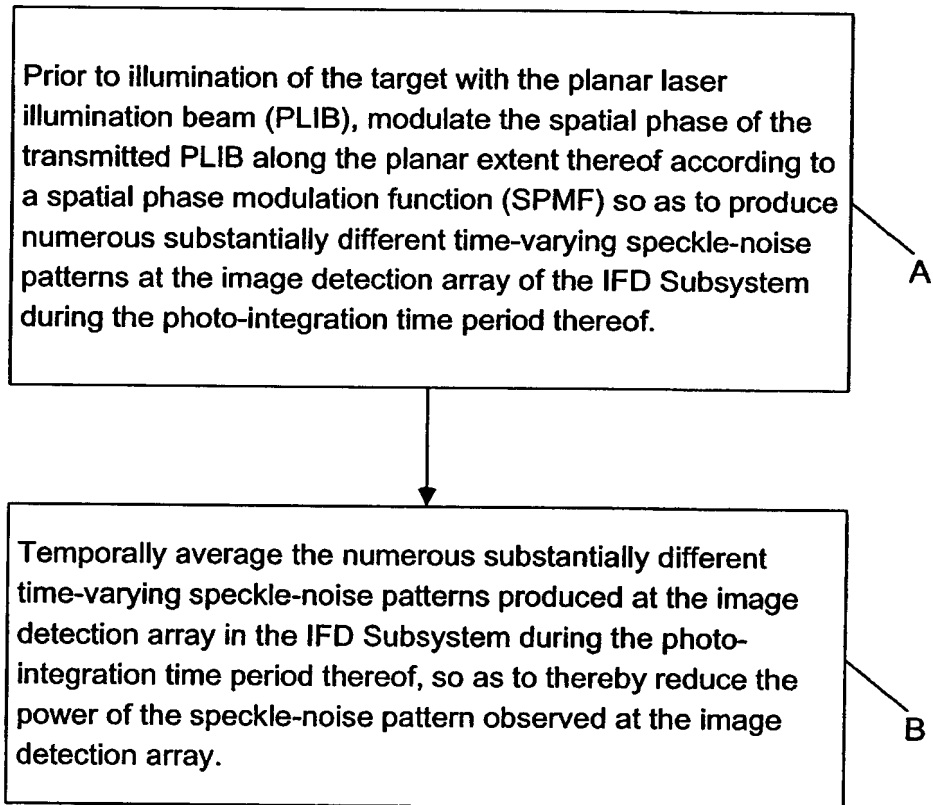
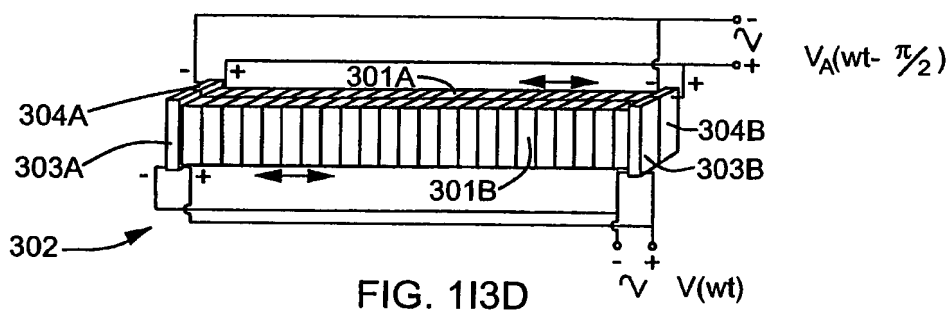
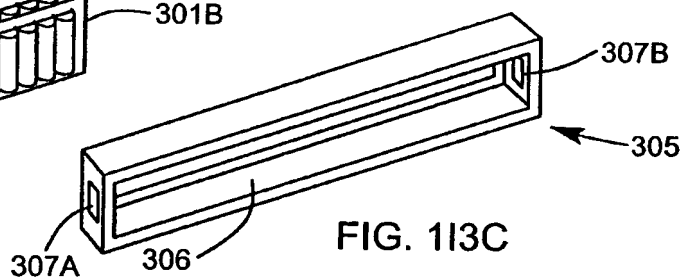
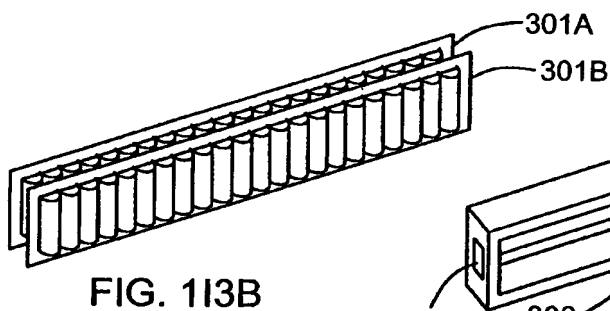
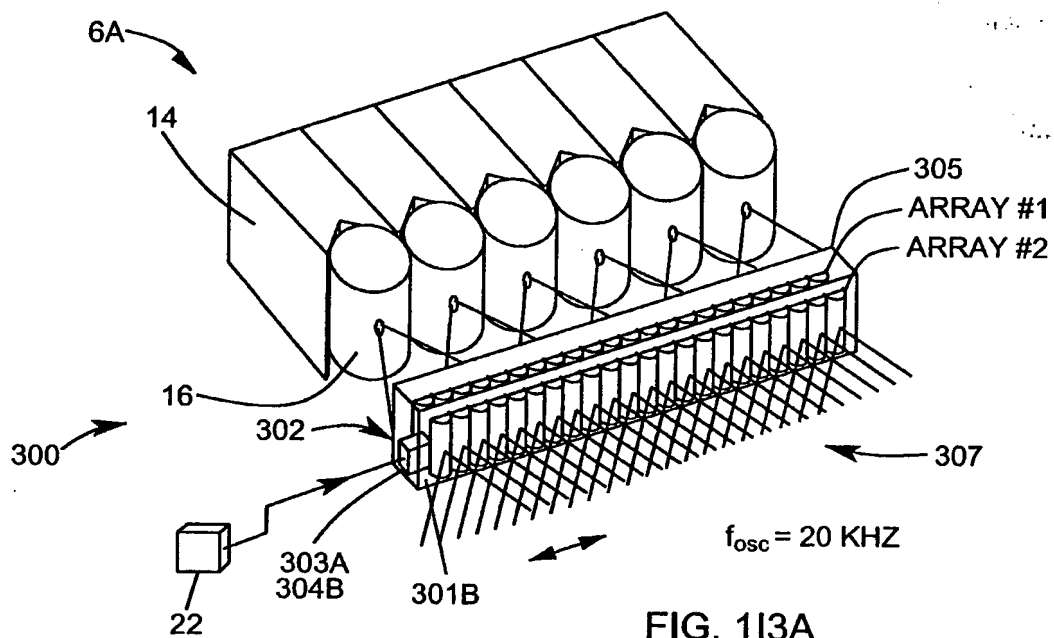
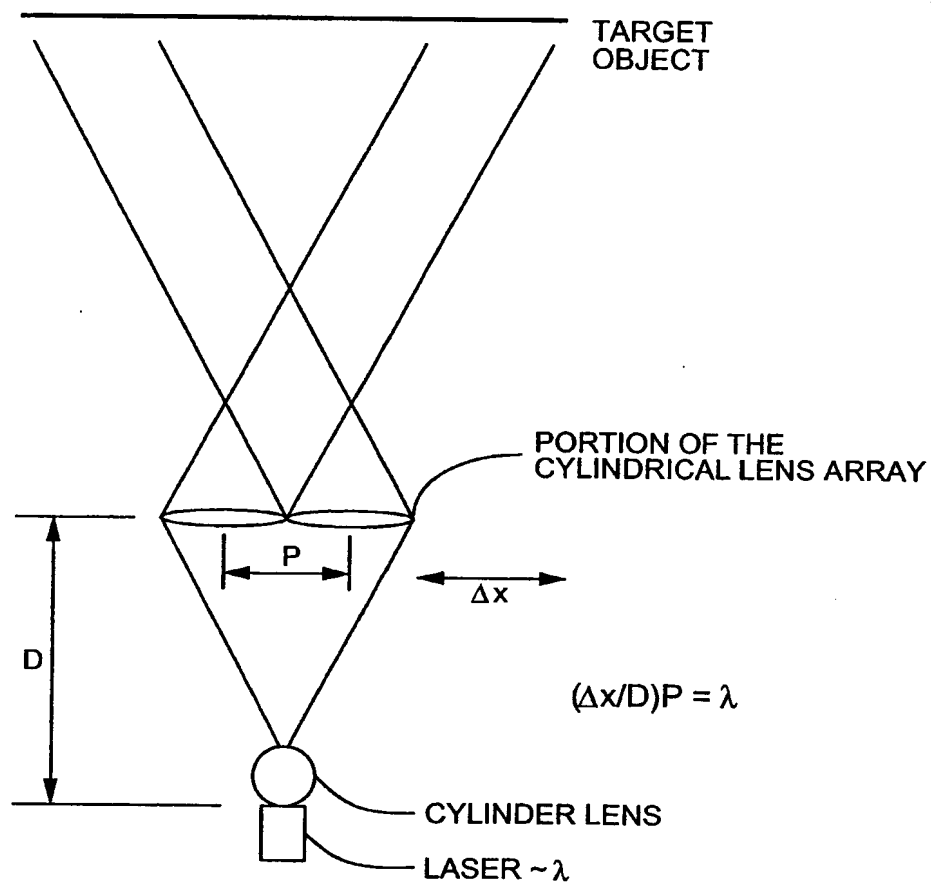


FIG. 1I2B



200020 0452500F



$$\Delta x \geq \frac{\lambda \cdot D}{P}$$

FIG. 113E

206020" 04529007

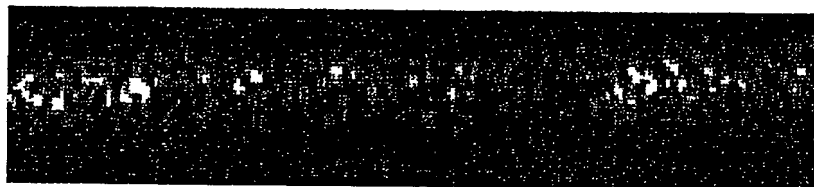
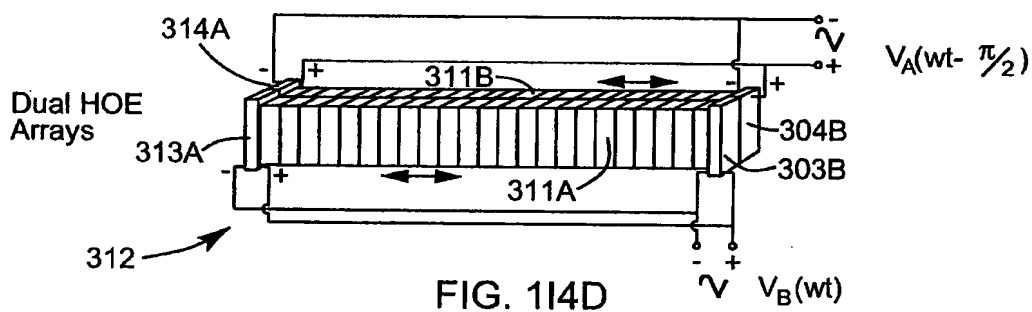
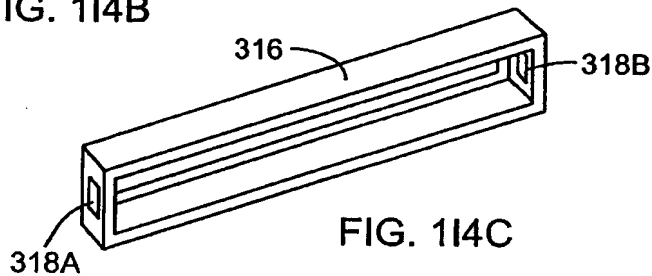
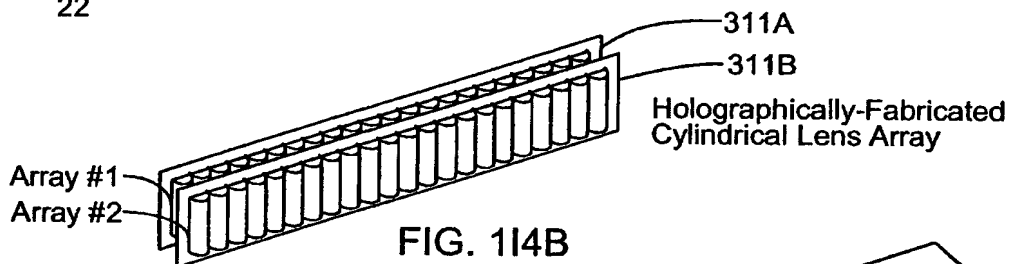
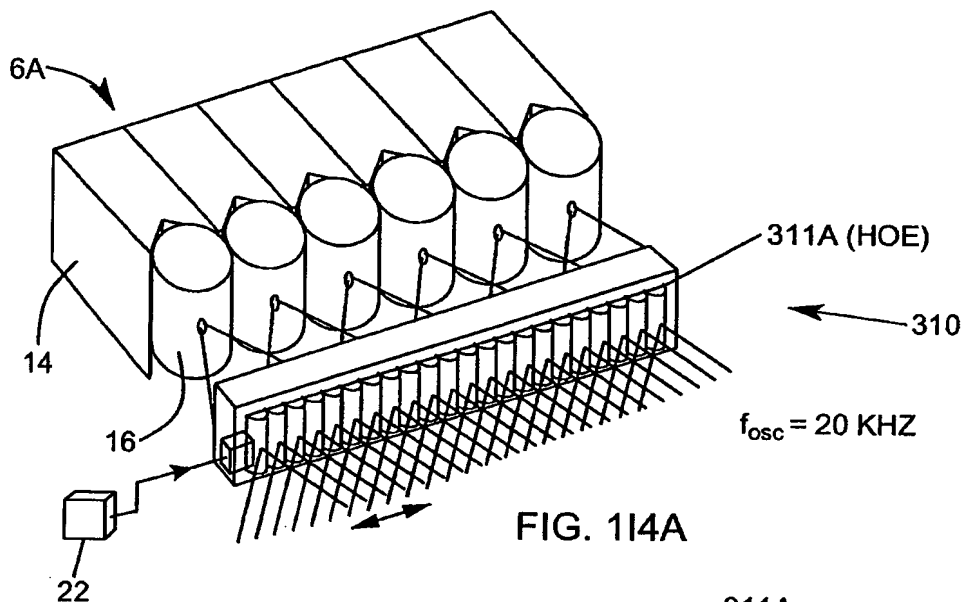
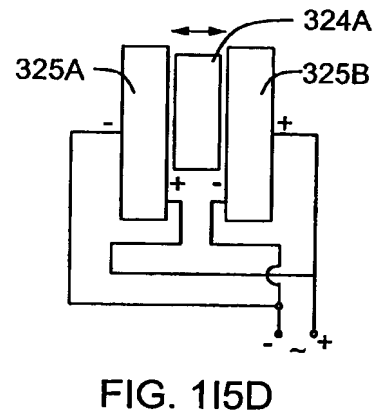
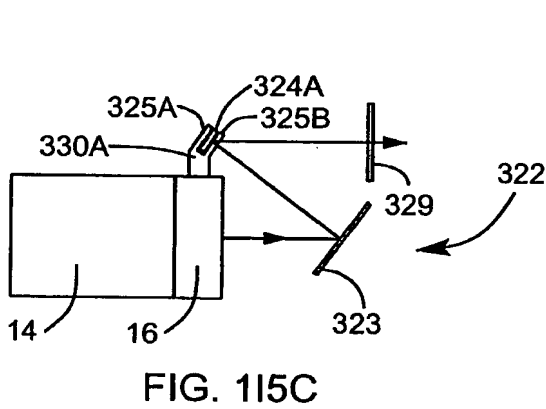
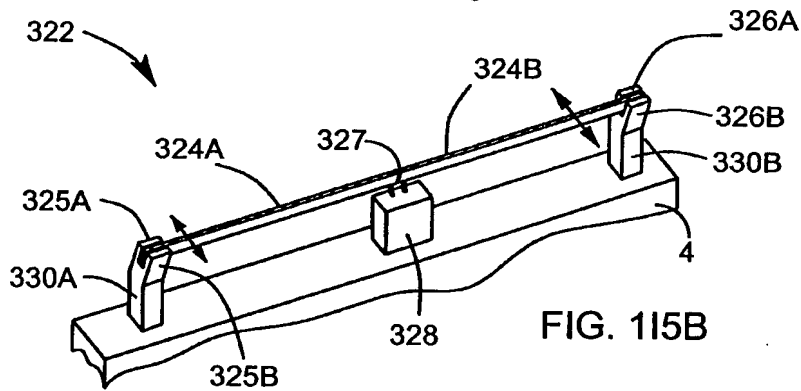
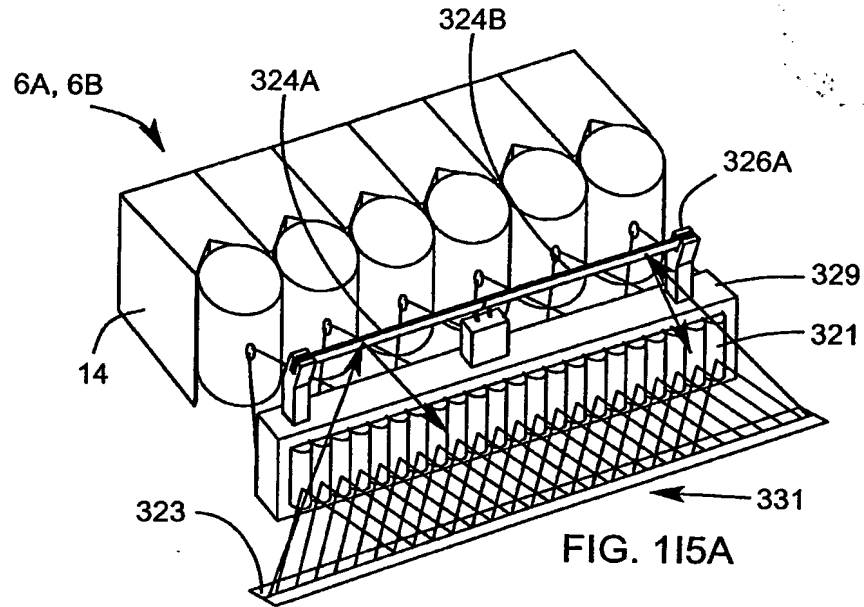


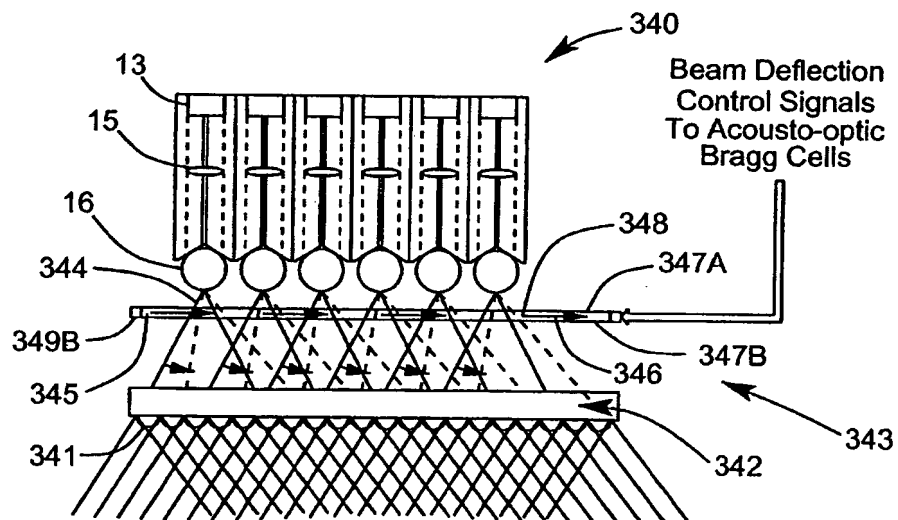
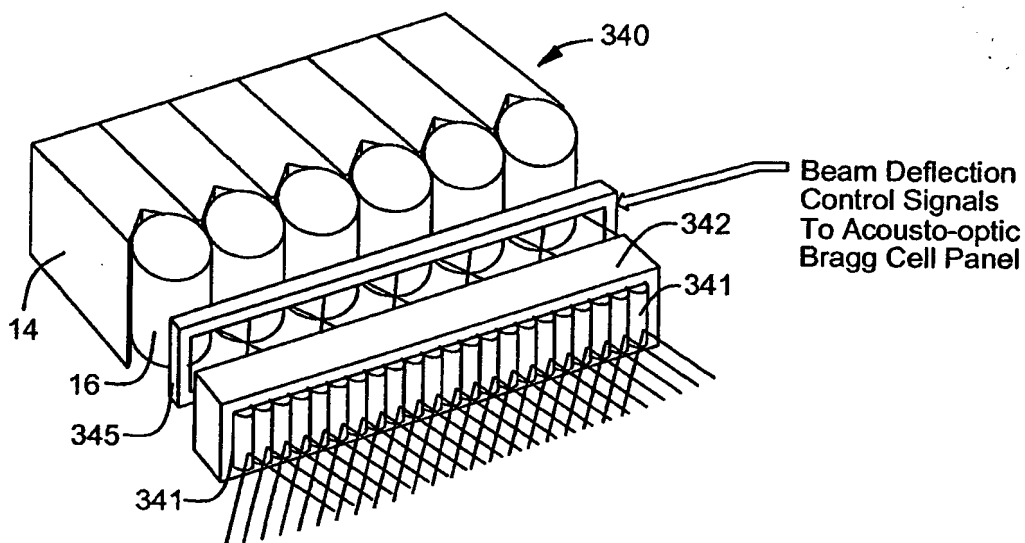
FIG. 113F



FIG. 113G







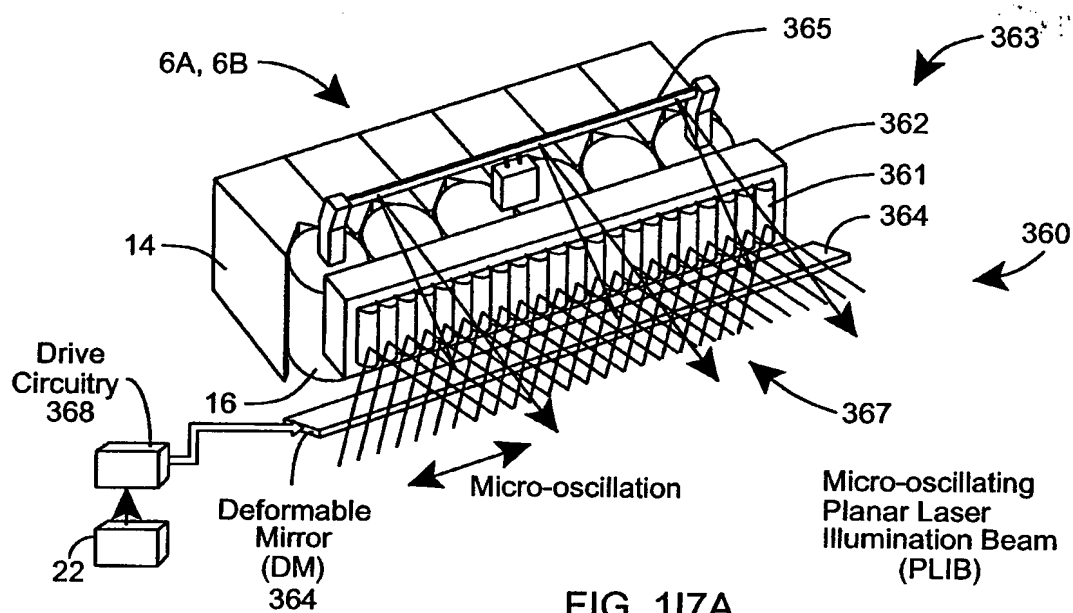


FIG. 117A

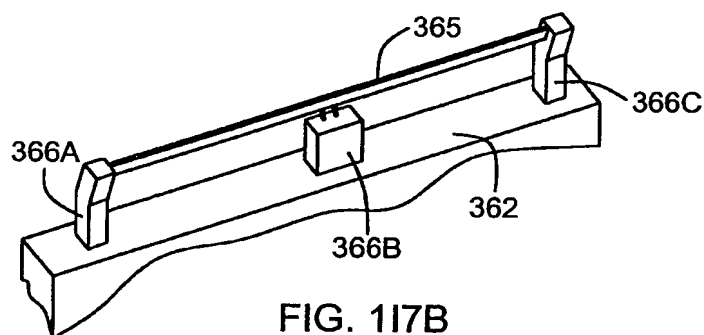


FIG. 117B

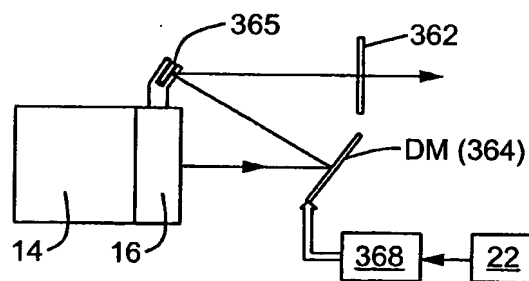


FIG. 117C

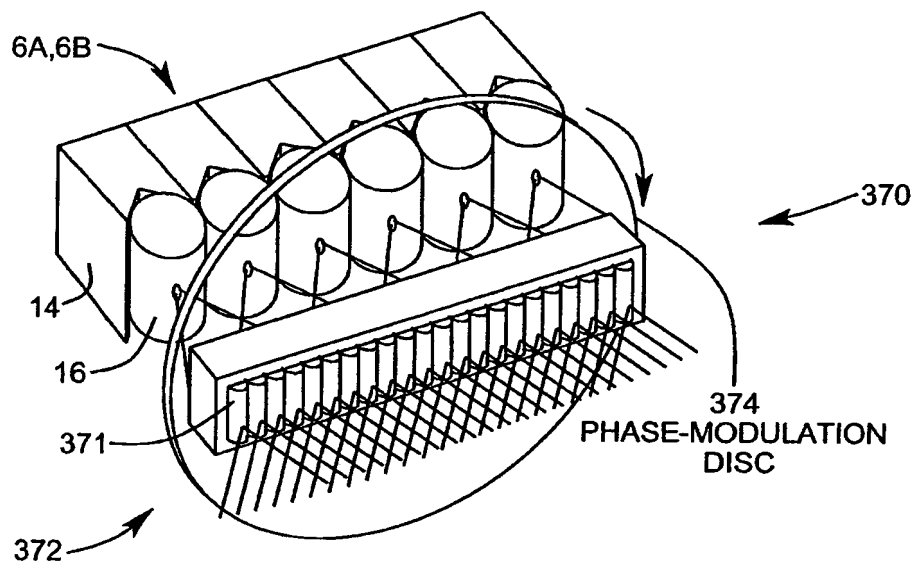


FIG. 118A

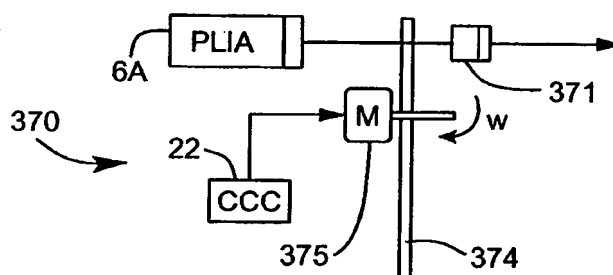


FIG. 118B

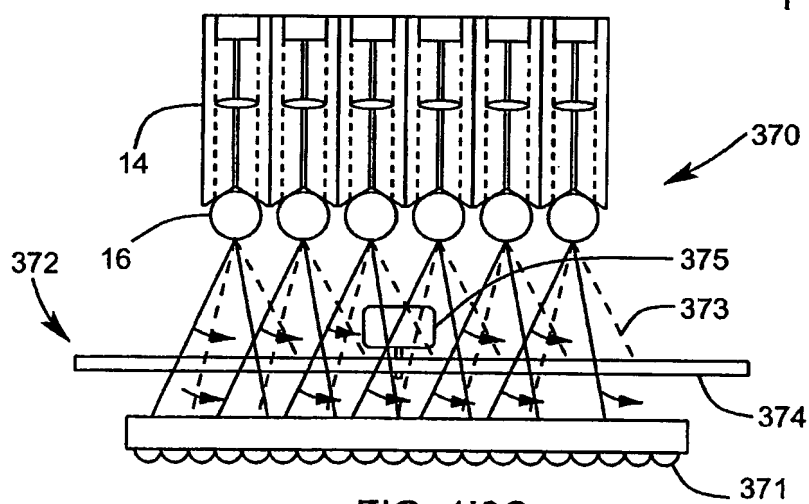


FIG. 118C

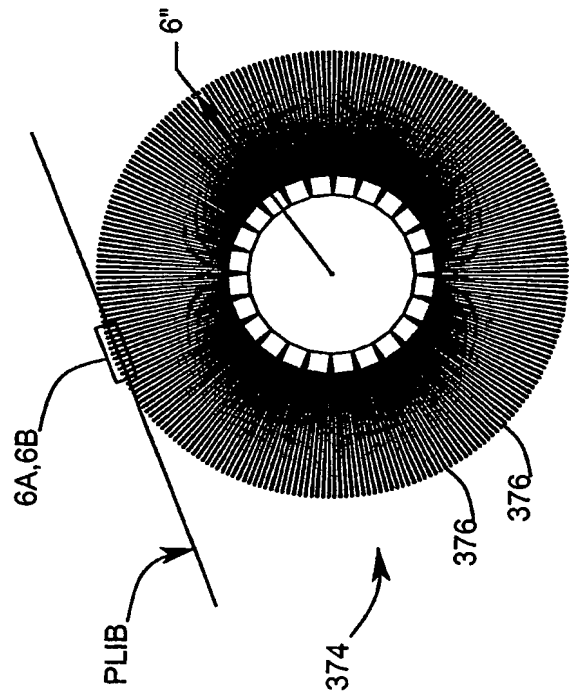


FIG. 118D

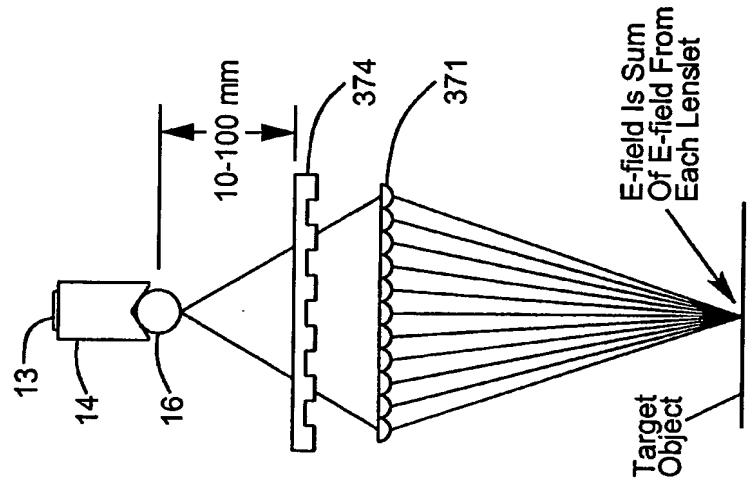


FIG. 118E

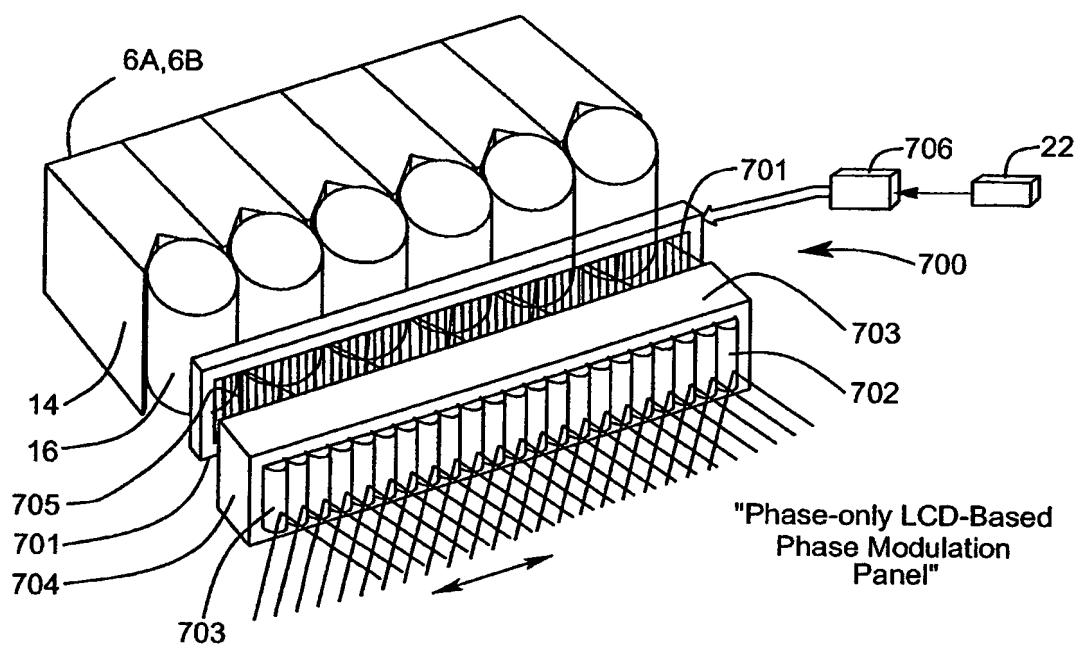


FIG. 118F

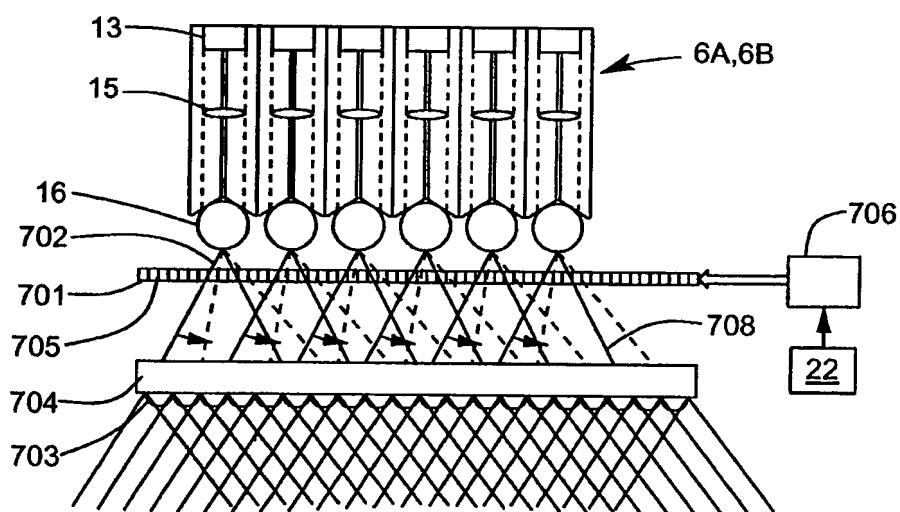


FIG. 118G

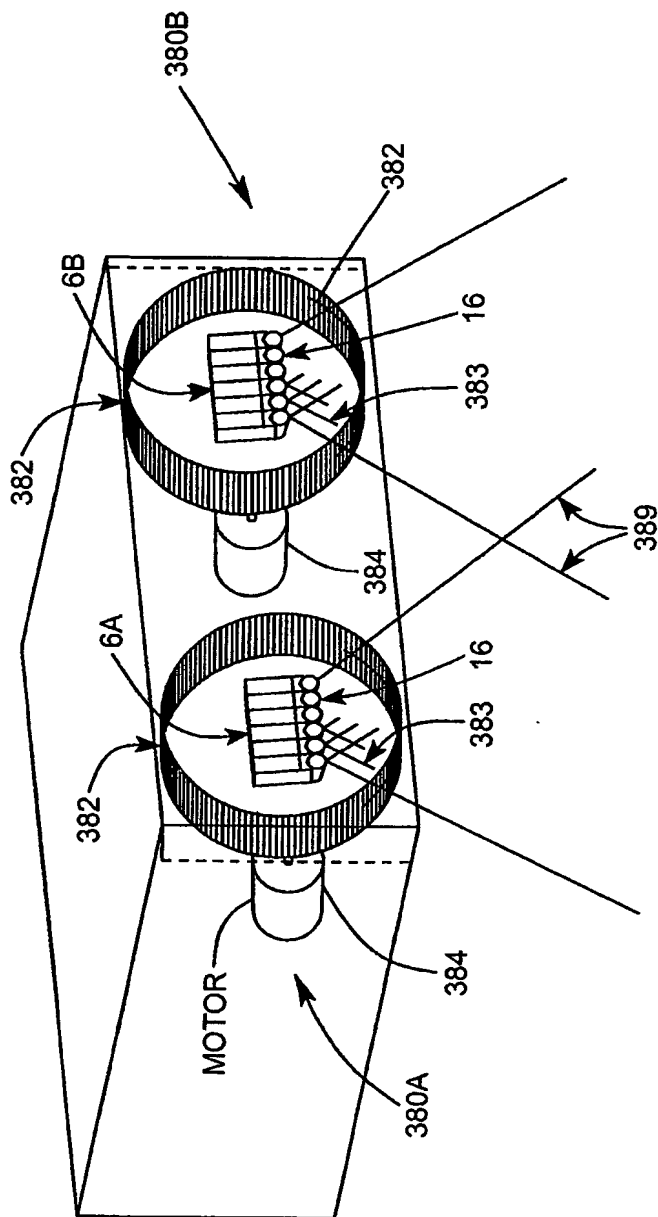


FIG. 119A

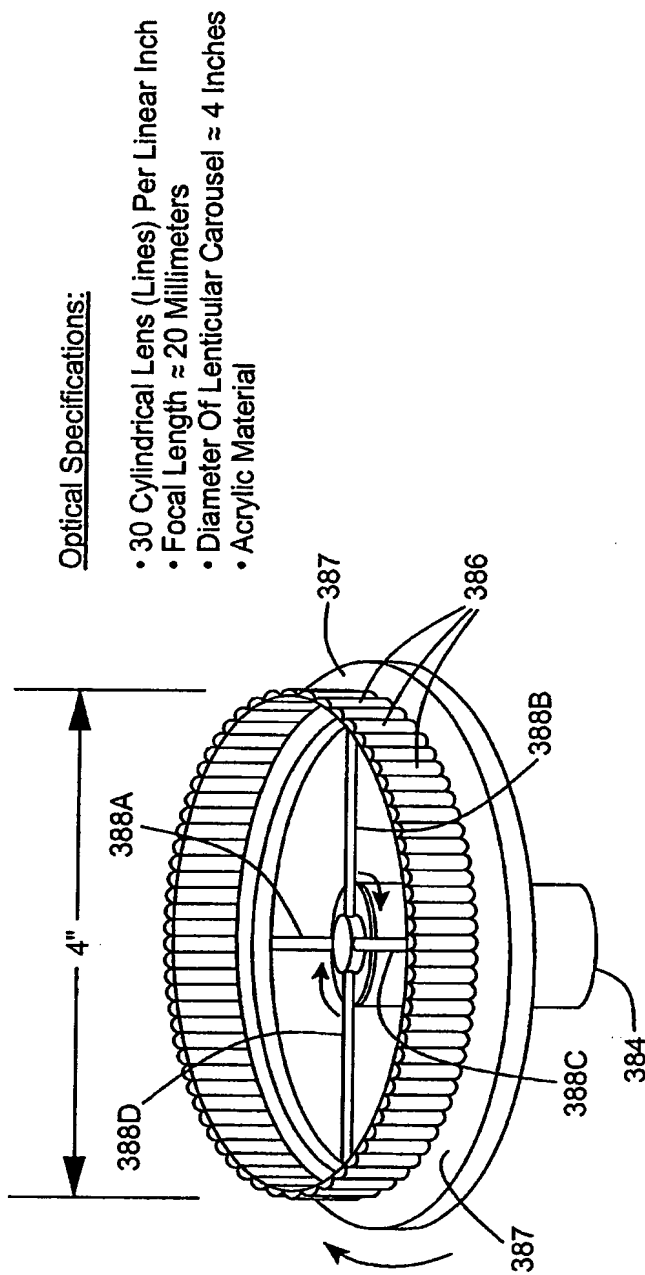


FIG. 119B

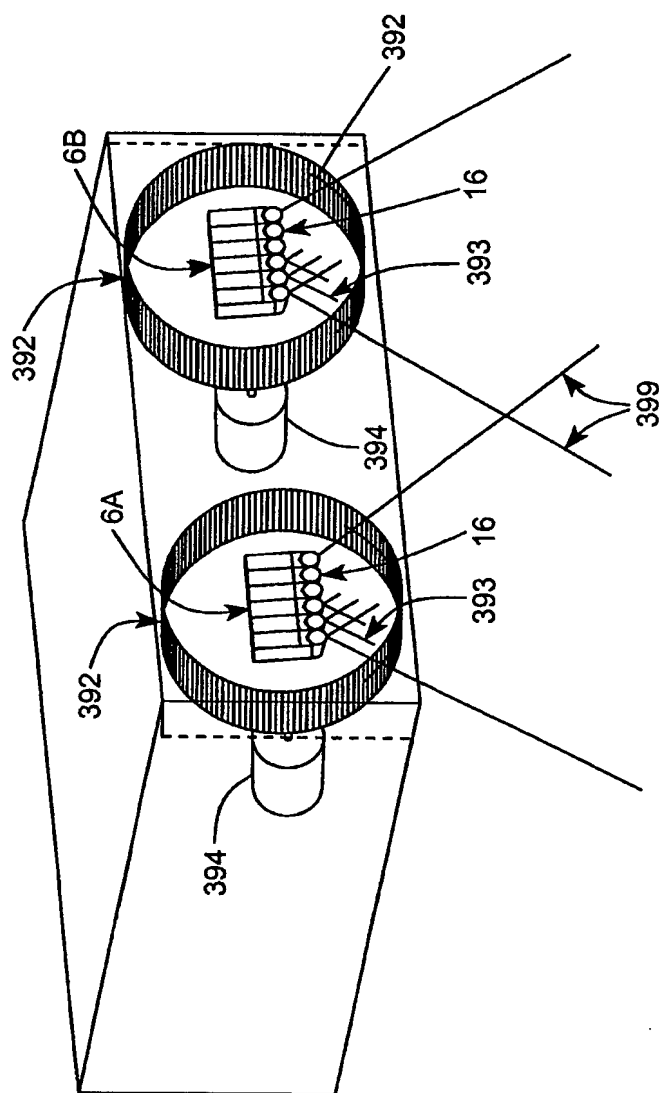
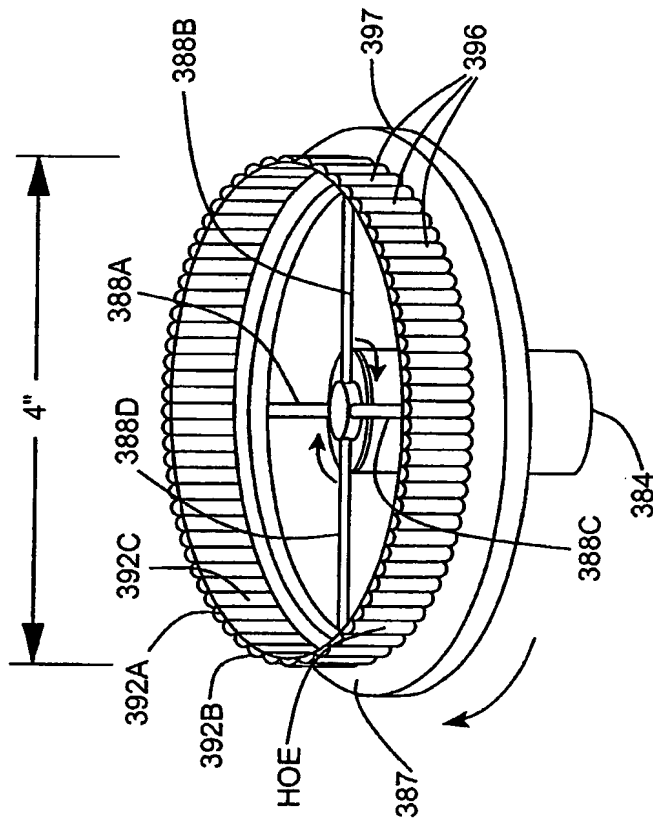


FIG. 1110A



Optical Specifications:

- 30 Cylindrical Lens (Lines) Per Linear Inch
- Focal Length \approx 20 Millimeters
- Diameter Of Lenticular Carousel \approx 4 Inches

FIG. 110B

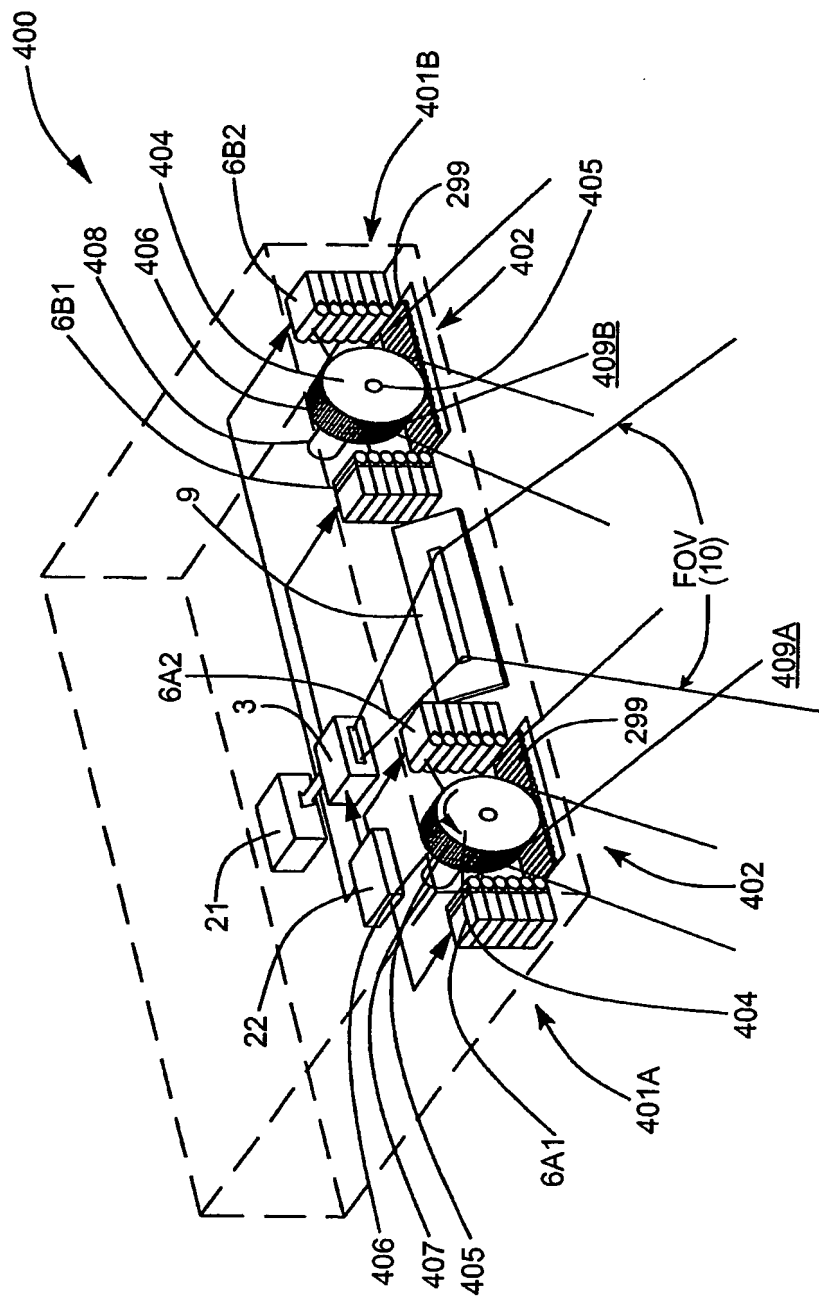


FIG. 1111A

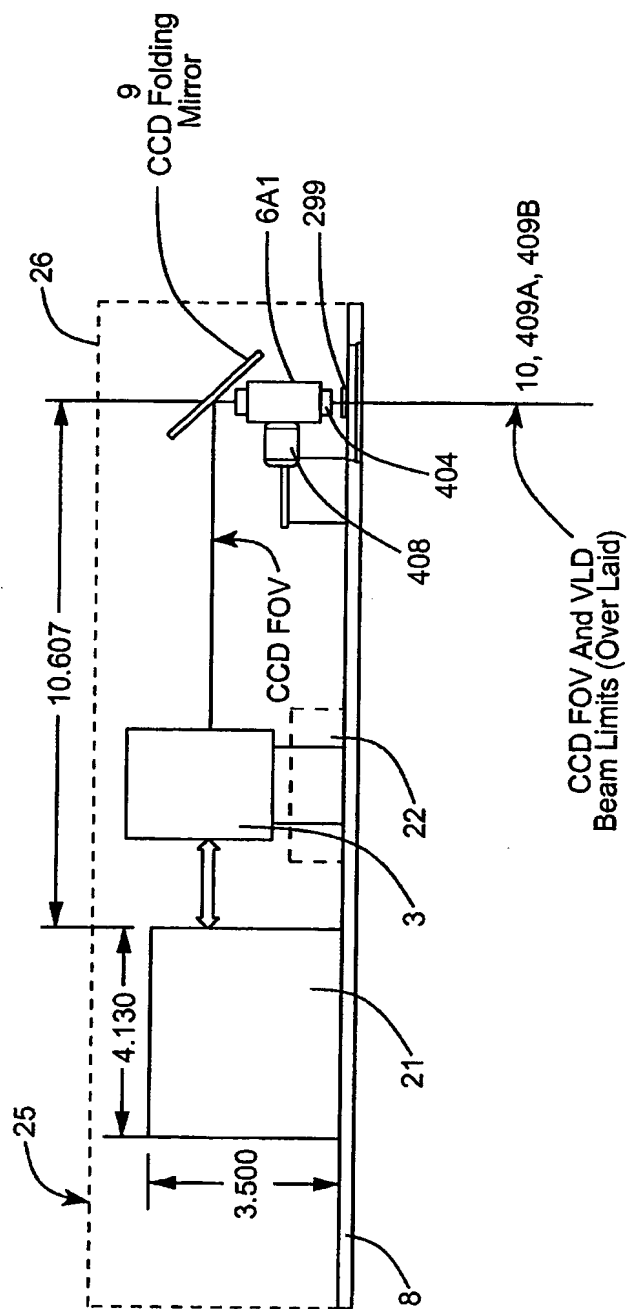


FIG. 1111B

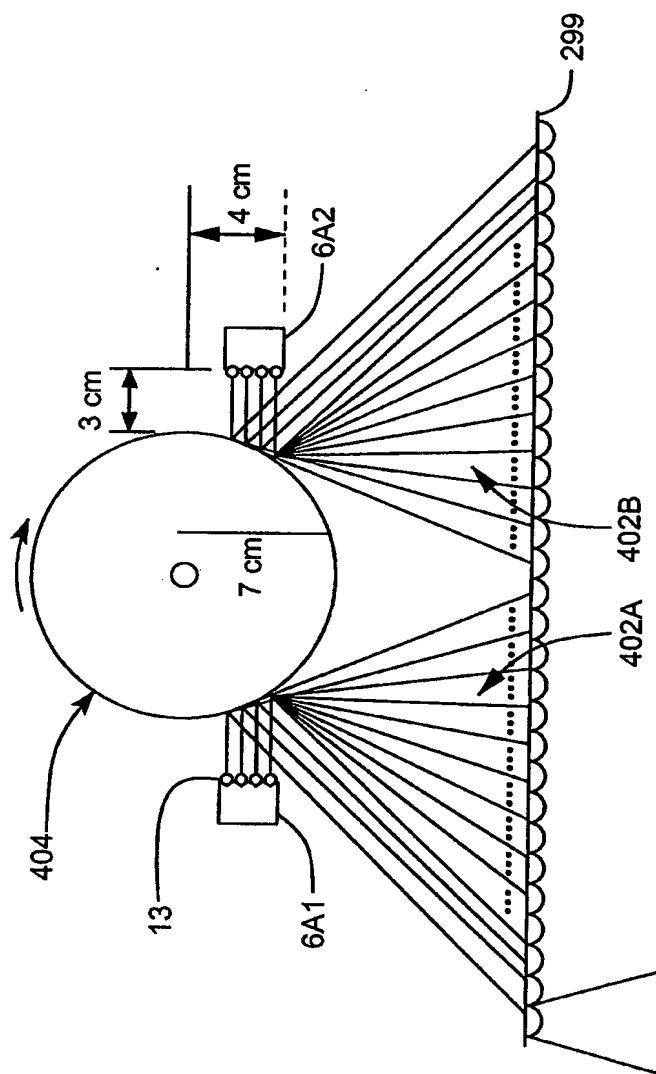


FIG. 1111C

200020 04523001

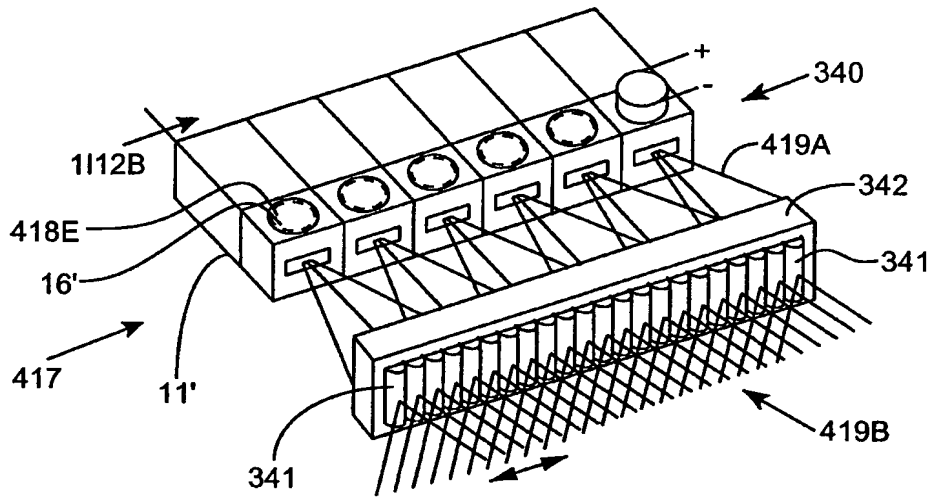


FIG. 1112A

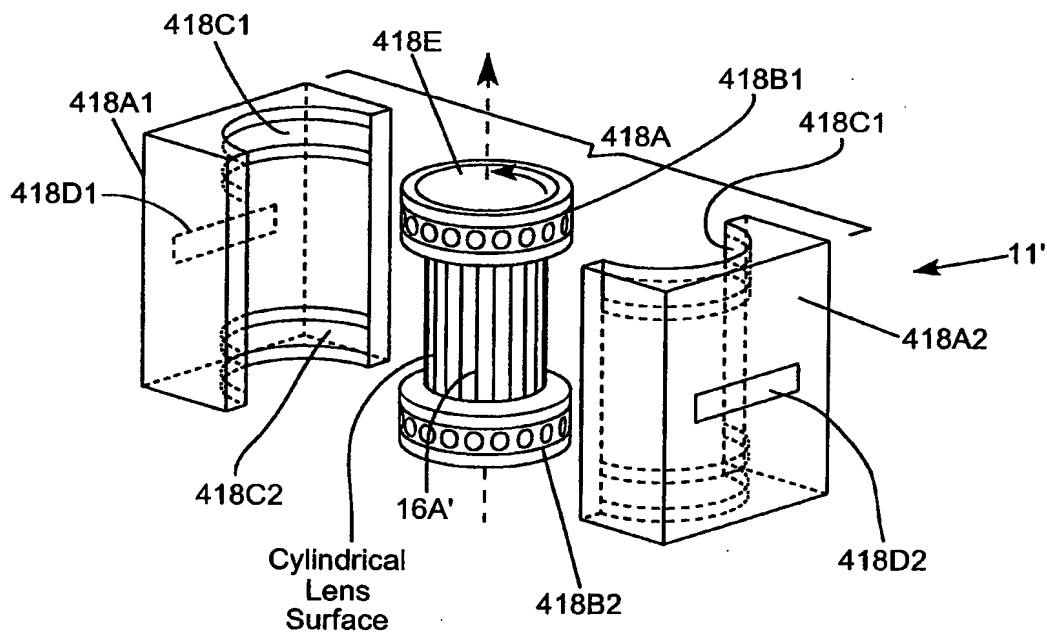


FIG. 1112B

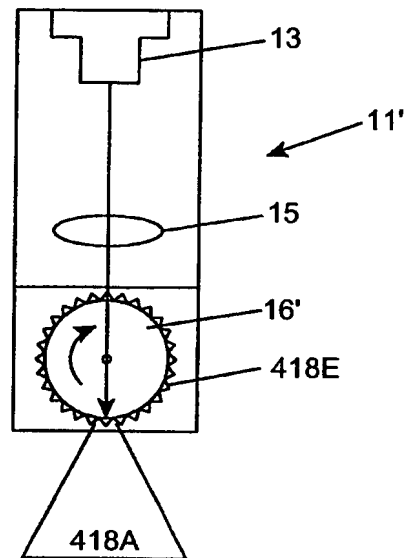


FIG. 1112C

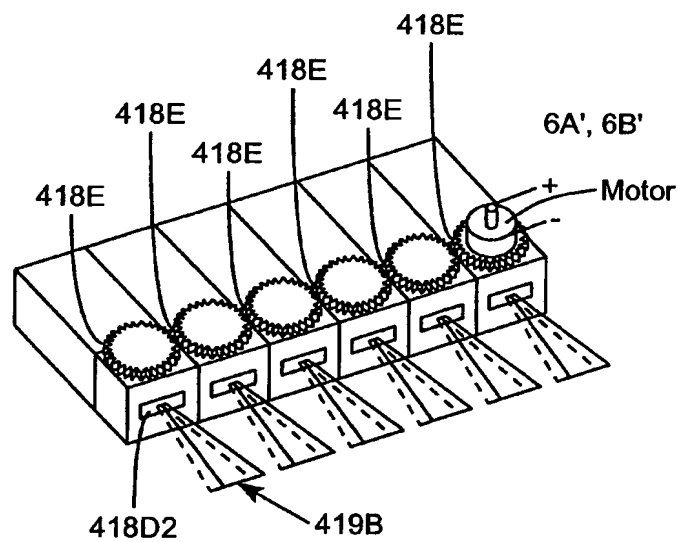


FIG. 1112D

Second Generalized Method Of
Reducing Speckle-Noise Patterns
At Image Detection Array
Of The IFD Subsystem (3)

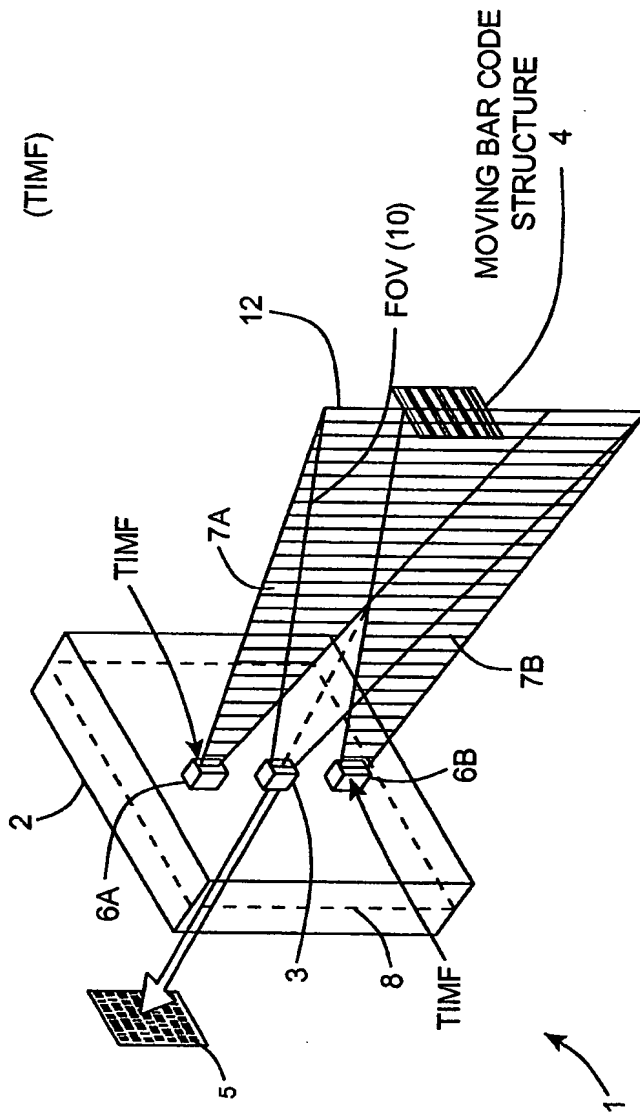


FIG. 1113

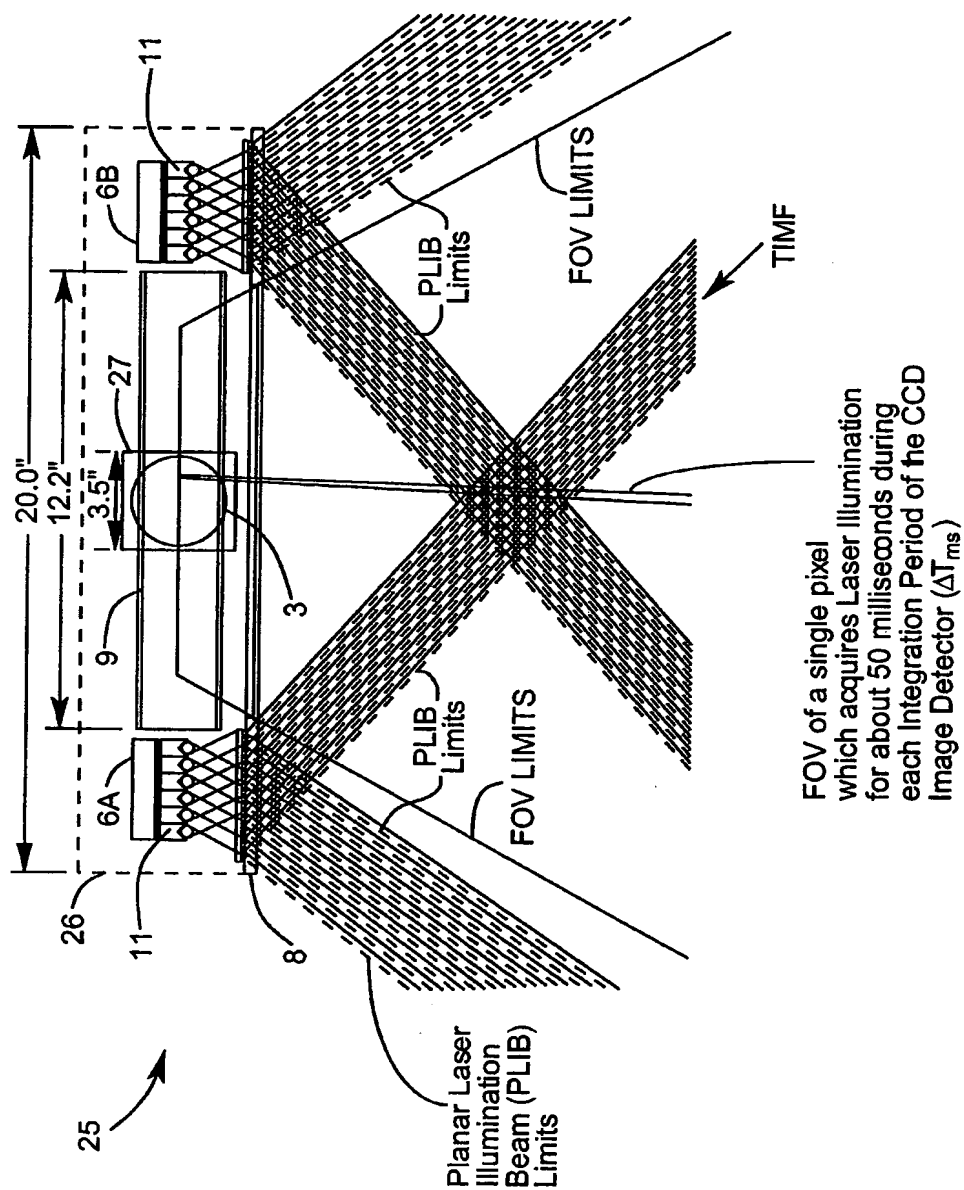


FIG. 1113A

THE SECOND GENERALIZED SPECKLE-NOISE PATTERN REDUCTION
METHOD OF THE PRESENT INVENTION

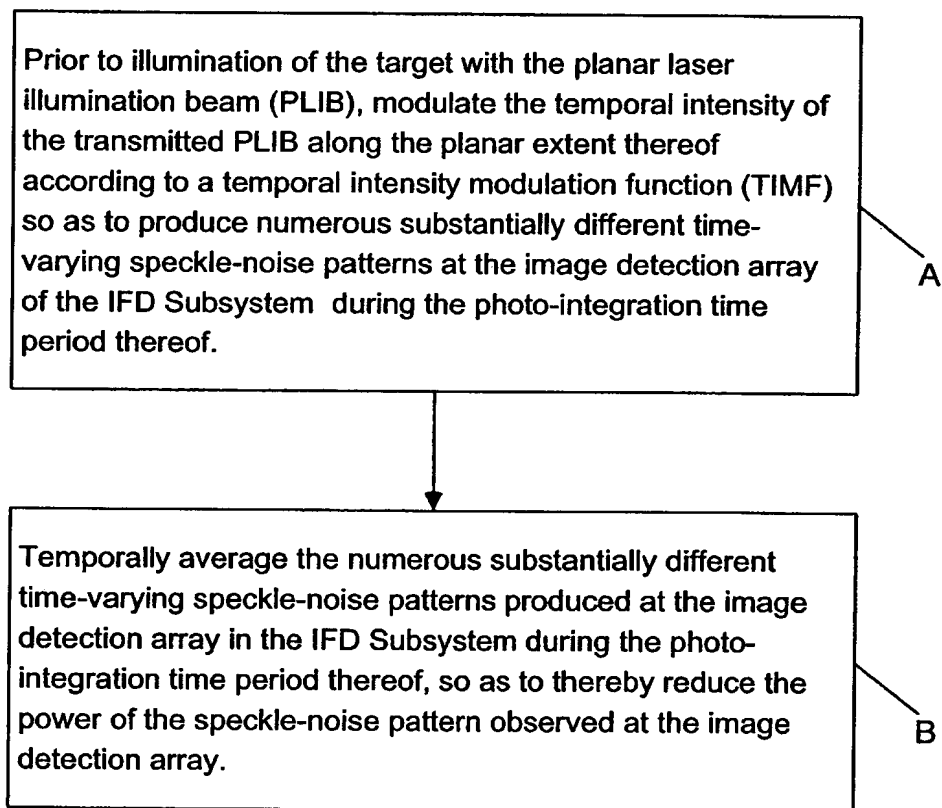


FIG. 1113B

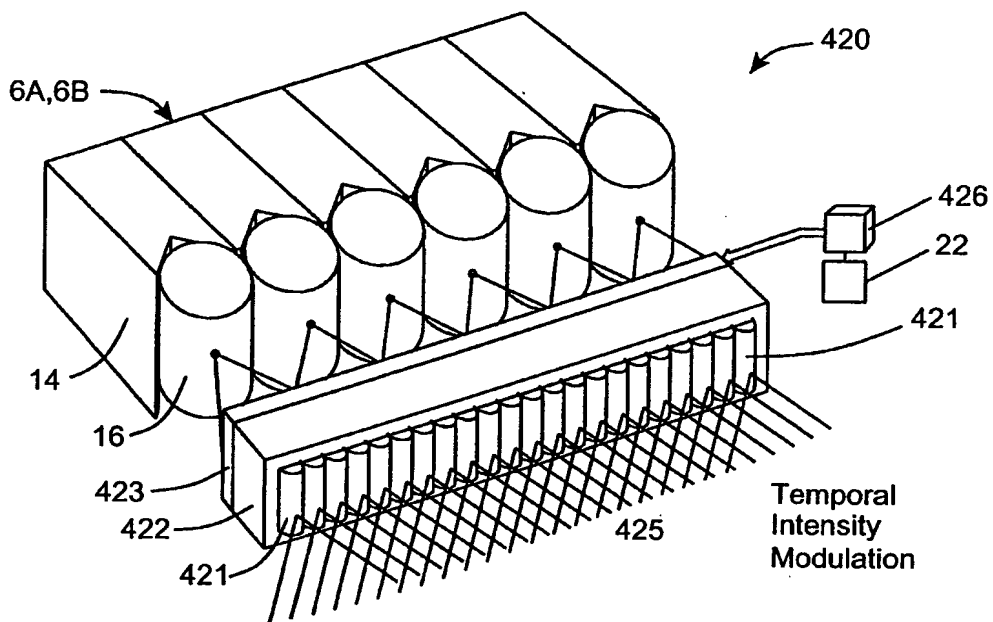


FIG. 1114A

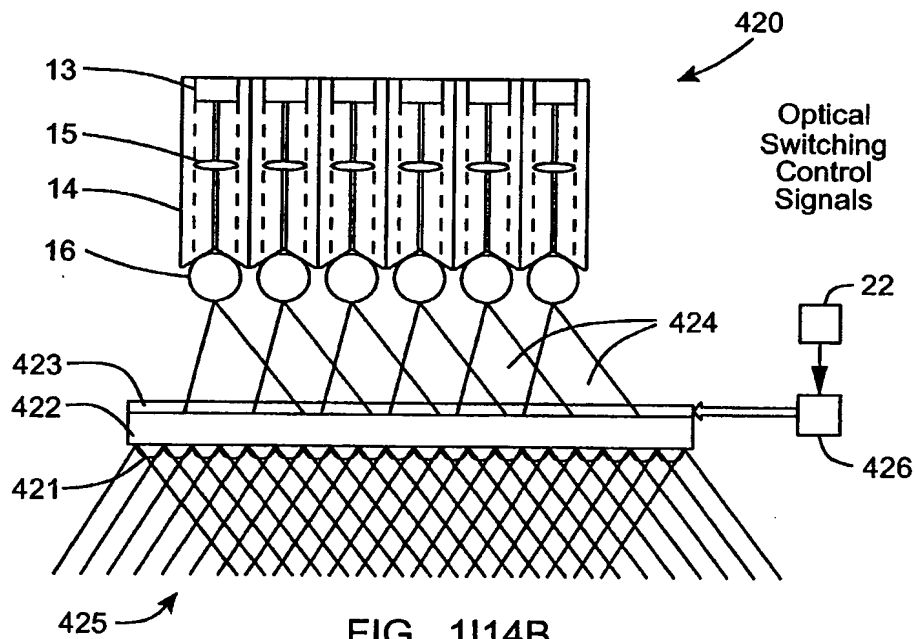


FIG. 1114B

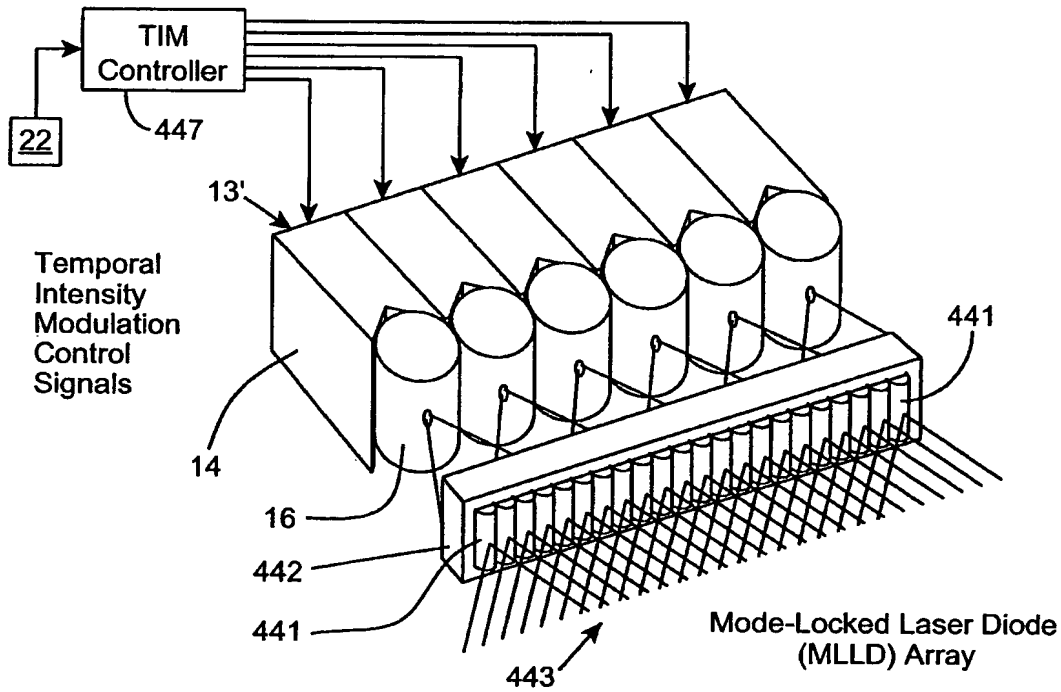


FIG. 1115A

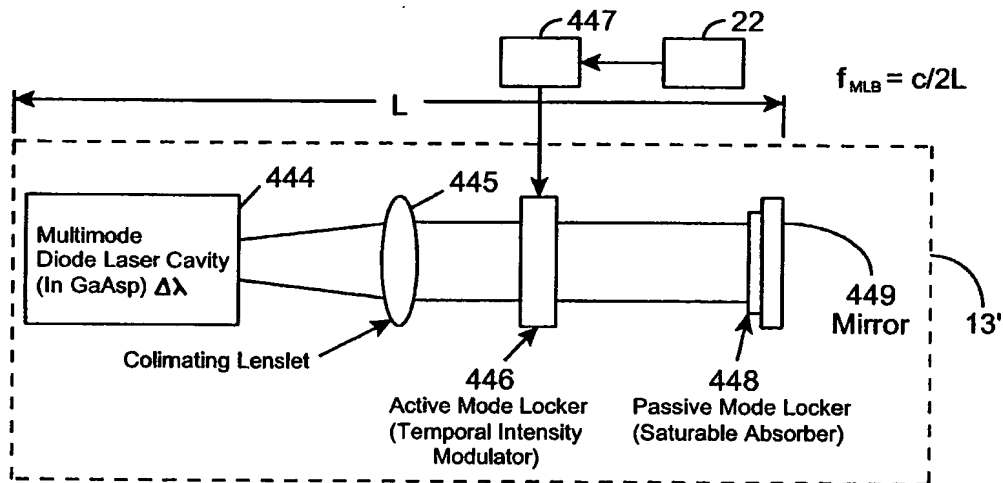


FIG. 1115B

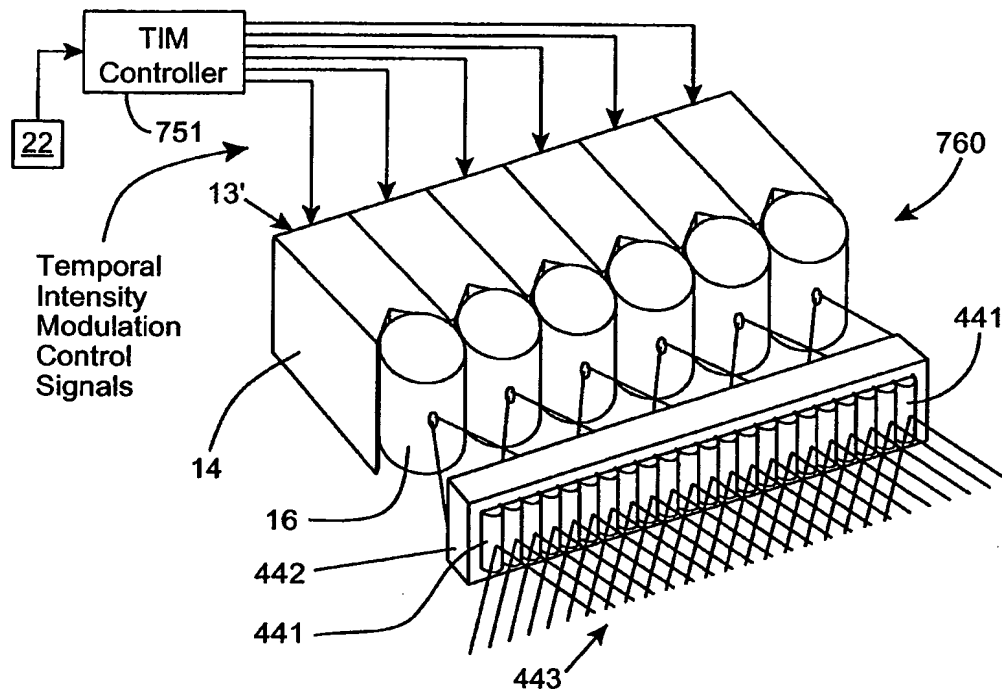


FIG. 1115C

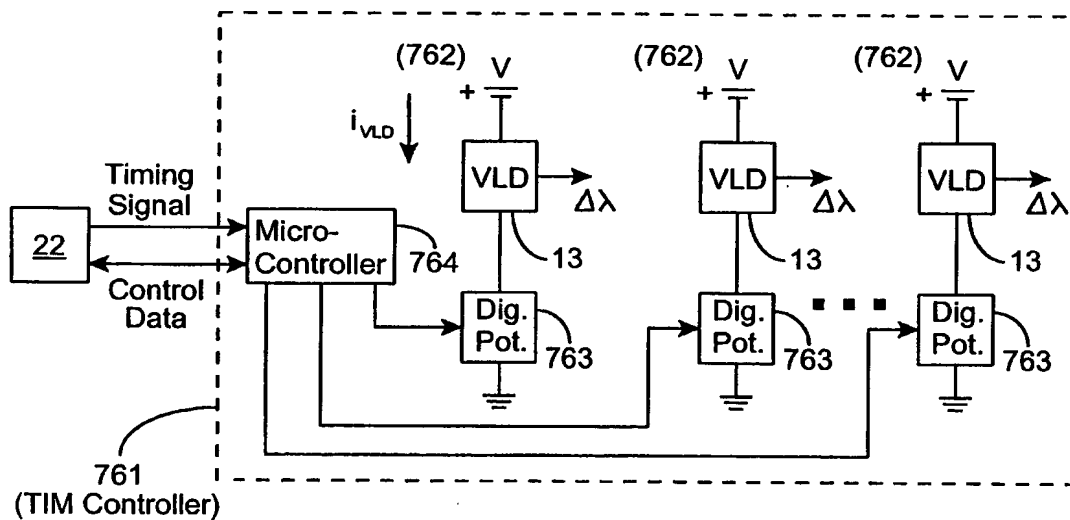


FIG. 1115D

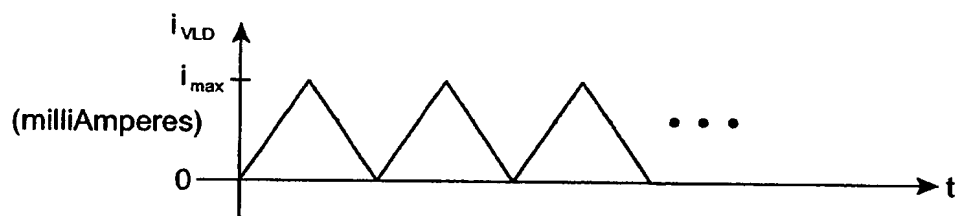


FIG. 1I15E

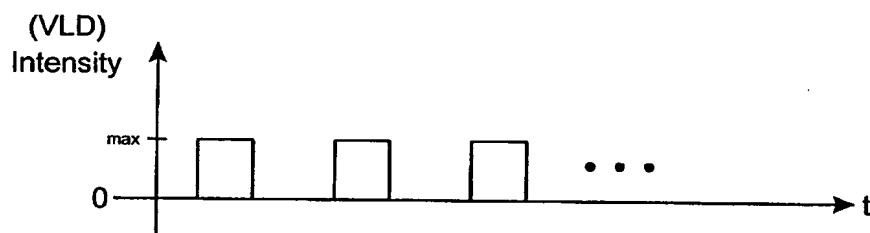


FIG. 1I15F

Third Generalized Method Of
Reducing Speckle-Noise Patterns
At Image Detection Array
Of The IFD Subsystem (3)

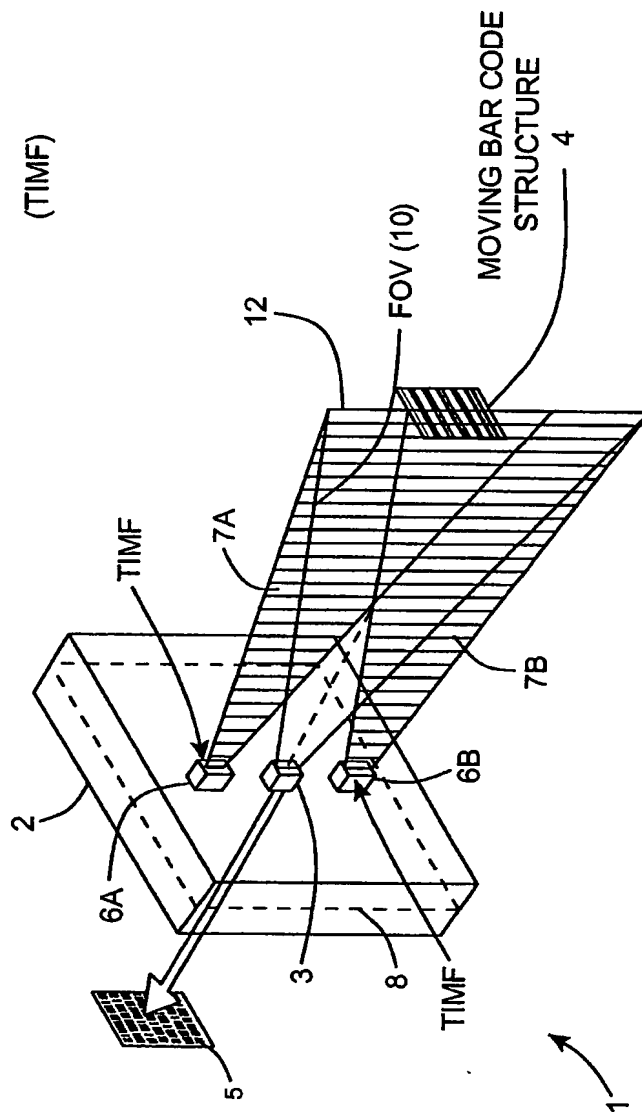


FIG. 1116

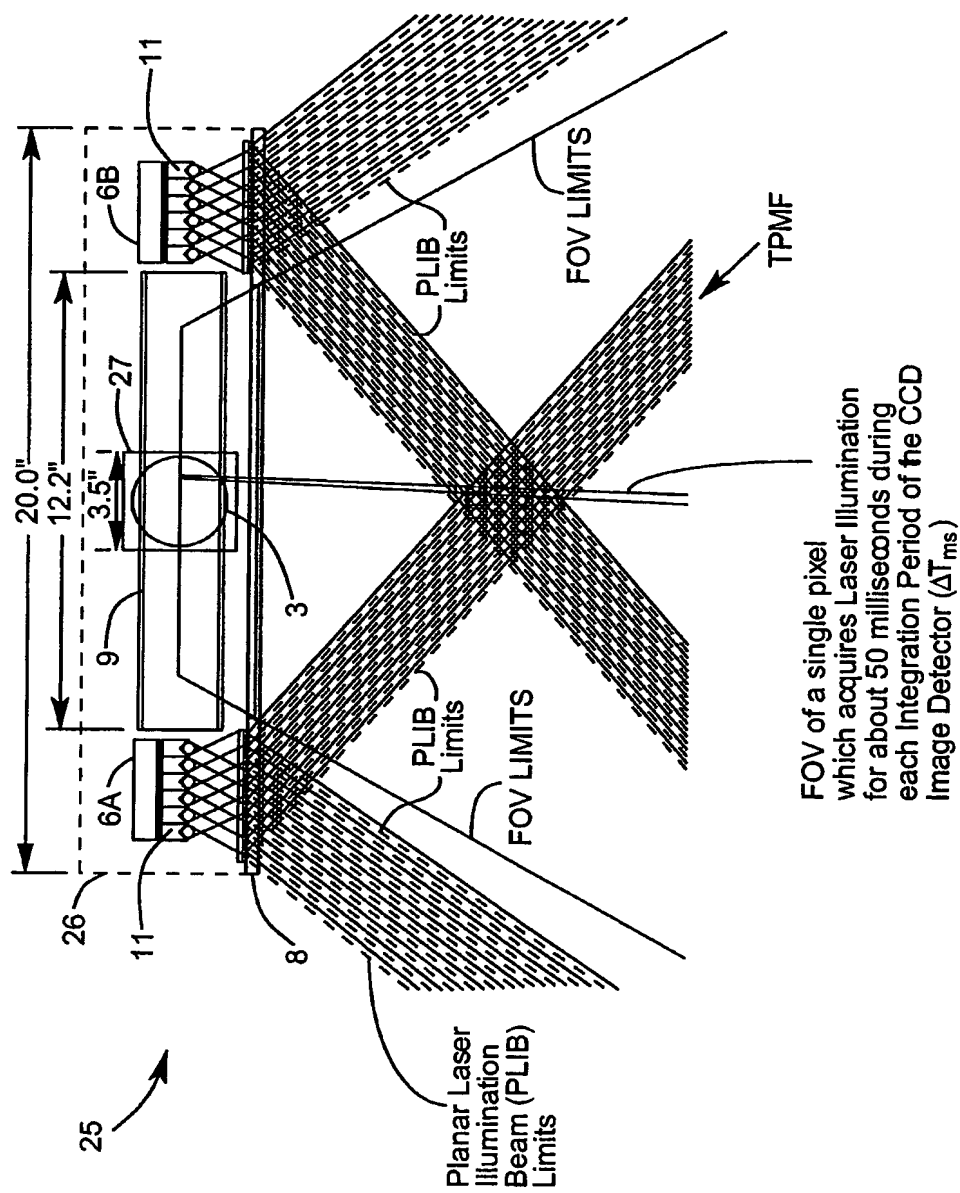


FIG. 1116A

THE THIRD GENERALIZED SPECKLE-NOISE PATTERN REDUCTION
METHOD OF THE PRESENT INVENTION

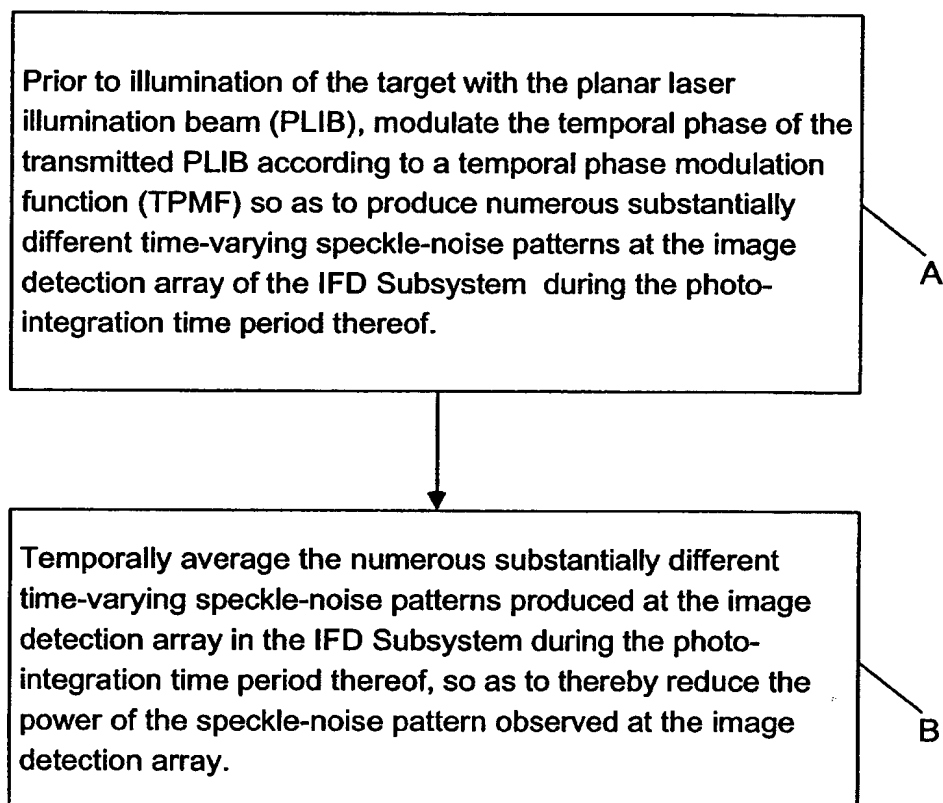


FIG. 1116B

200020 04523001

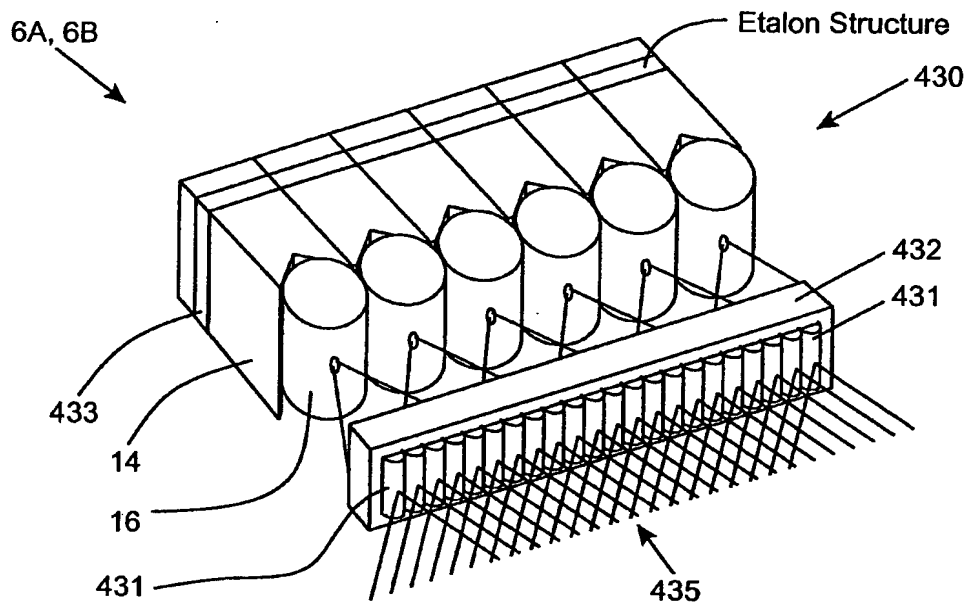


FIG. 1117A

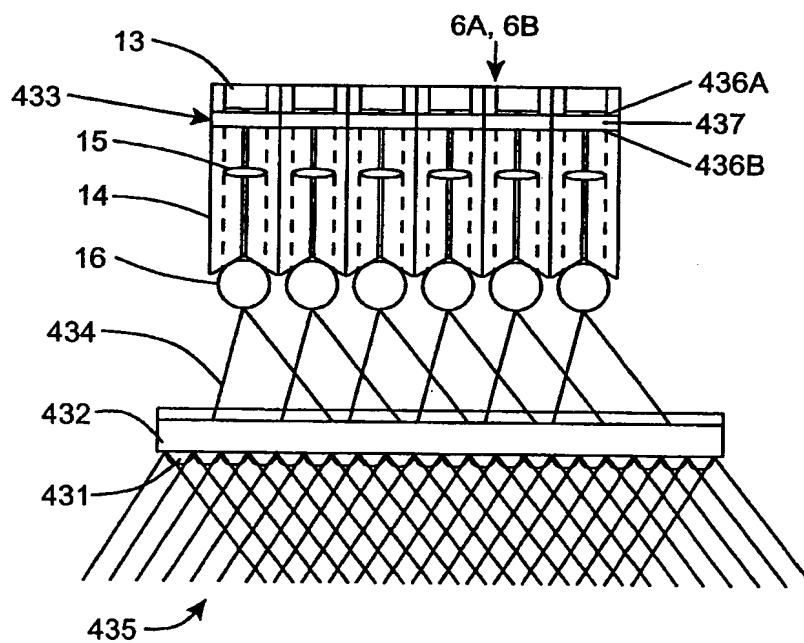


FIG. 1117B

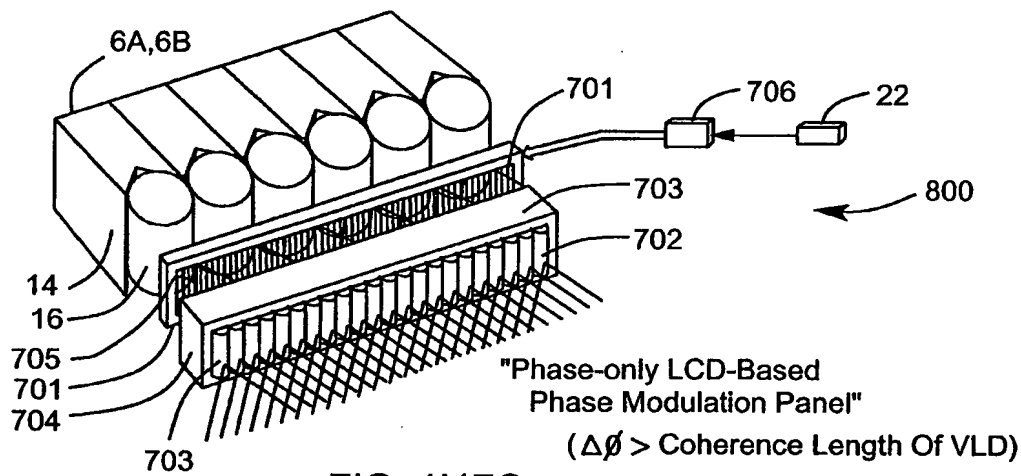


FIG. 117C

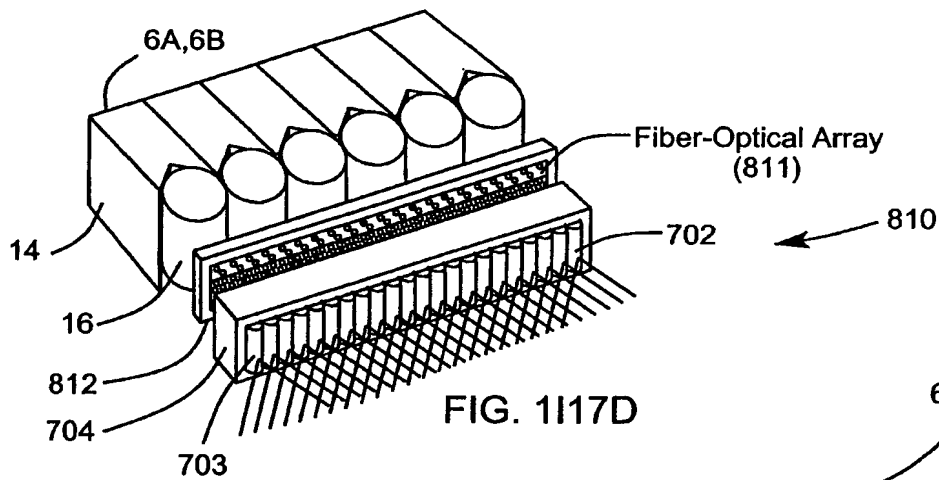


FIG. 1117D

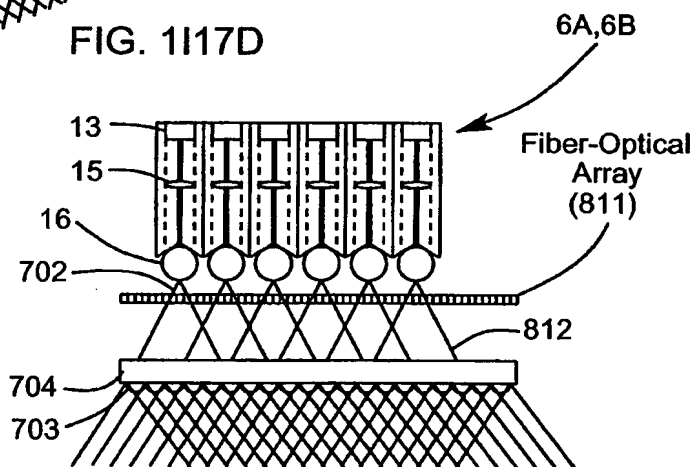


FIG. 1117E

Fourth Generalized Method Of
Reducing Speckle-Noise Patterns
At Image Detection Array
Of The IFD Subsystem (3)

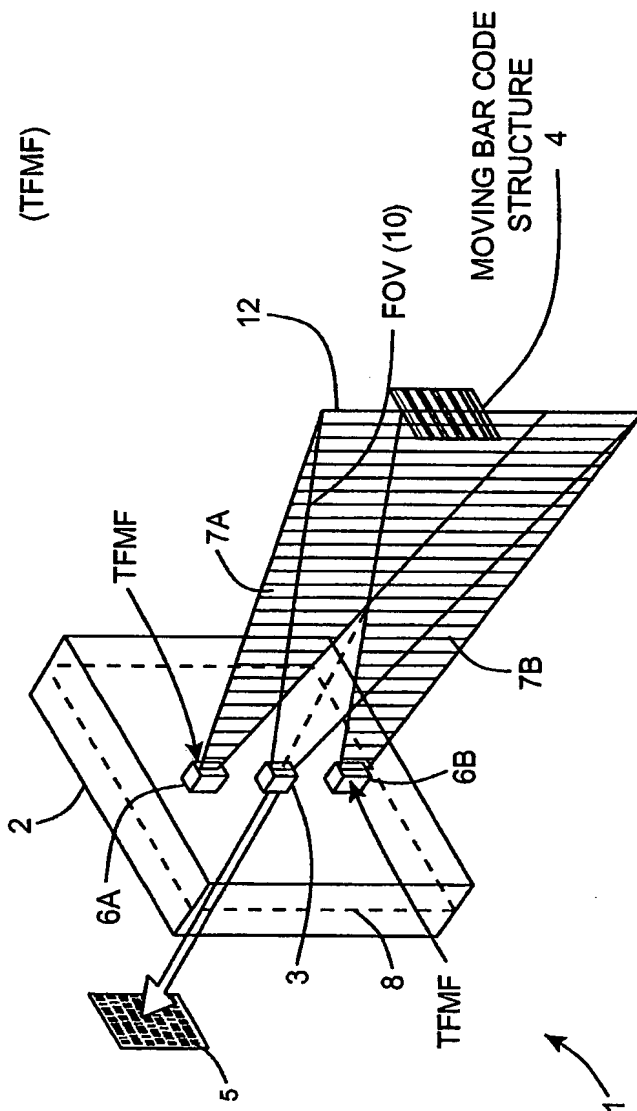
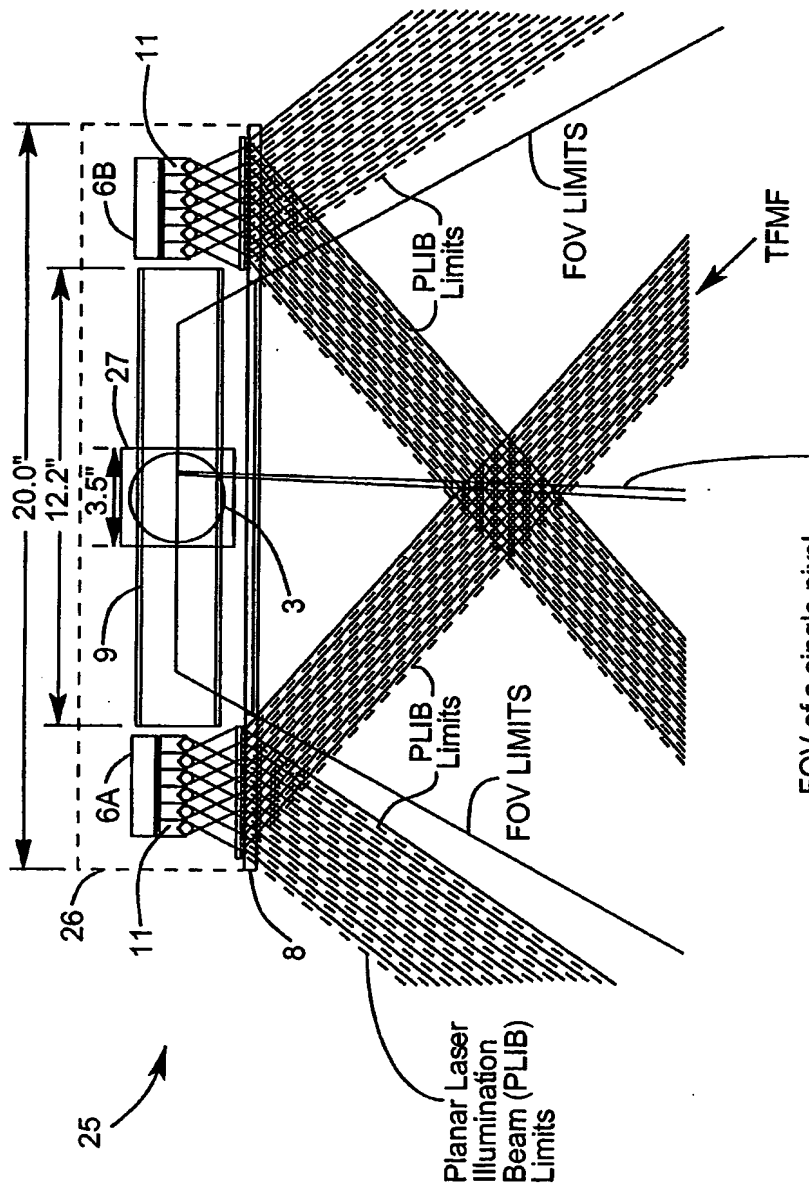


FIG. 1118



FOV of a single pixel
which acquires Laser Illumination
for about 50 milliseconds during
each Integration Period of the CCD
Image Detector (ΔT_{ms})

FIG. 1118A

THE FOURTH GENERALIZED SPECKLE-NOISE PATTERN REDUCTION
METHOD OF THE PRESENT INVENTION

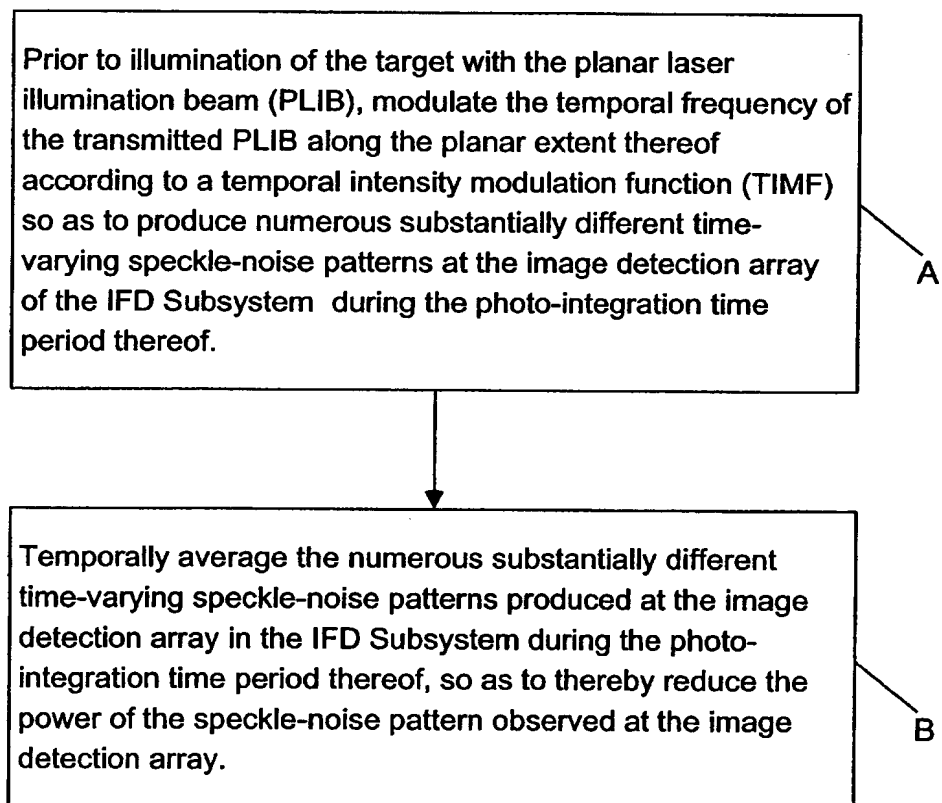


FIG. 1118B

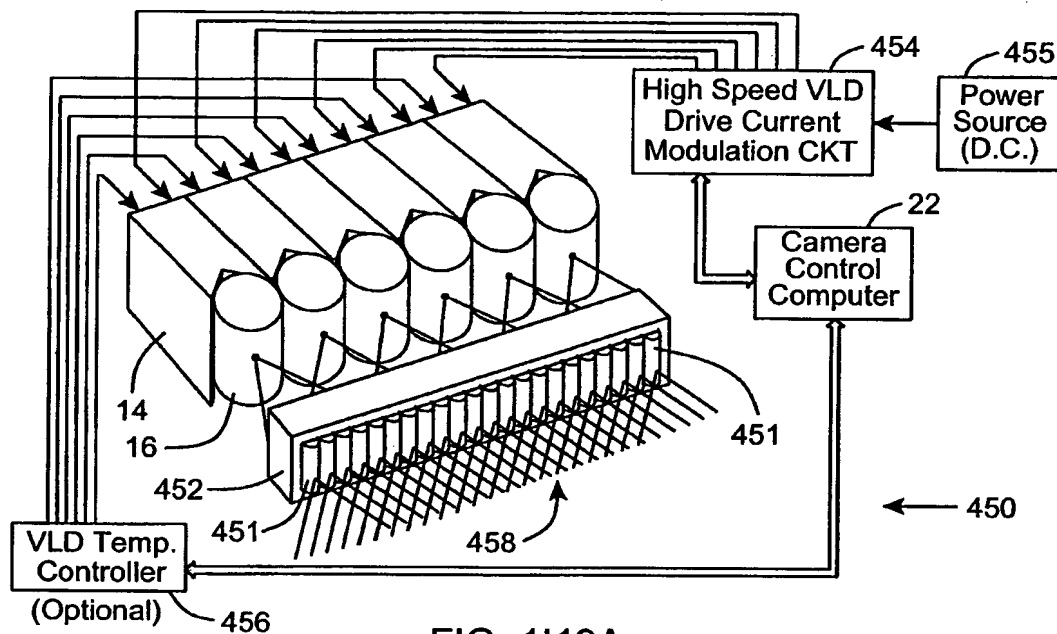


FIG. 1119A

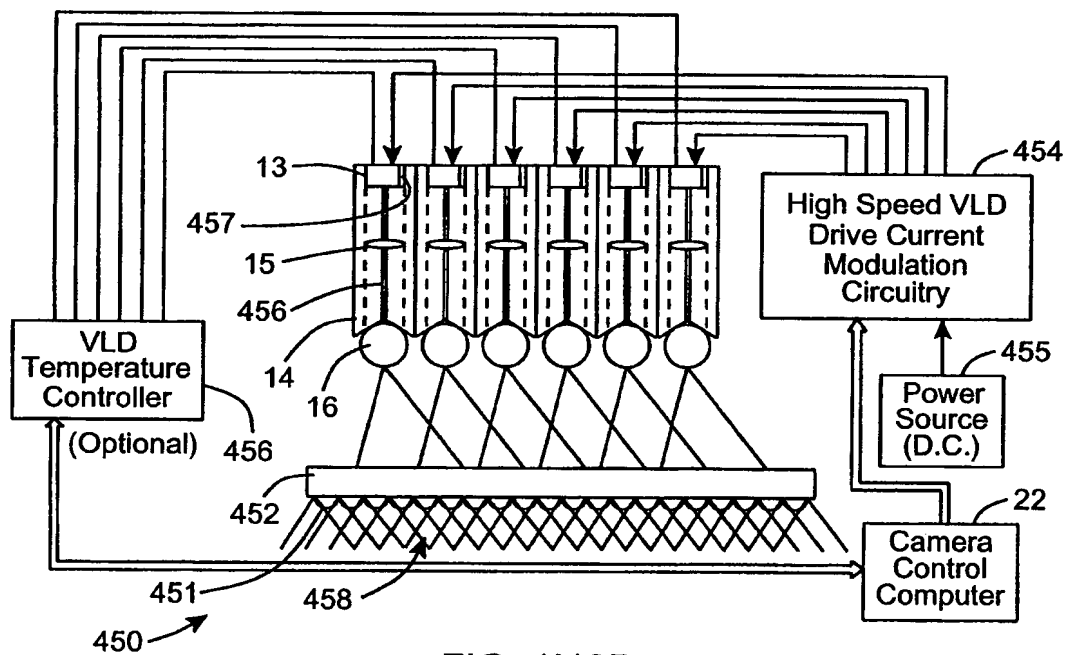


FIG. 1119B

20060207 04525001

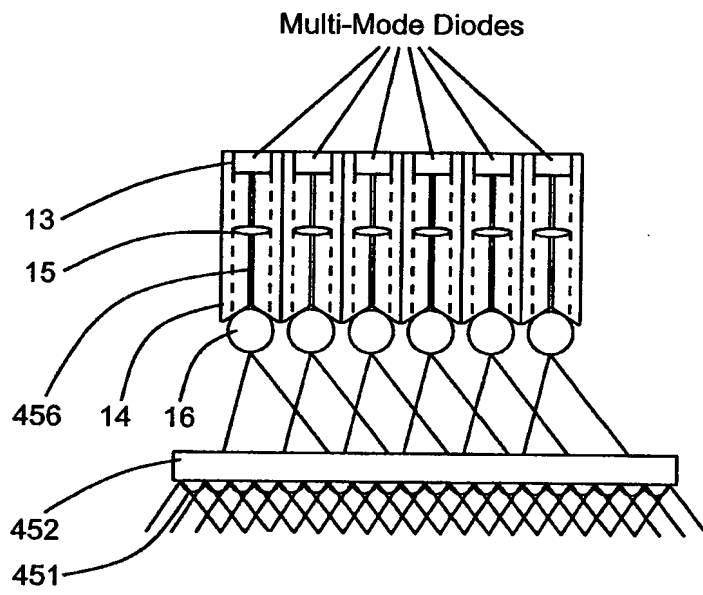


FIG. 1I19C

Fifth Generalized Method Of
Reducing Speckle-Noise Patterns
At Image Detection Array
Of The IFD Subsystem (3)

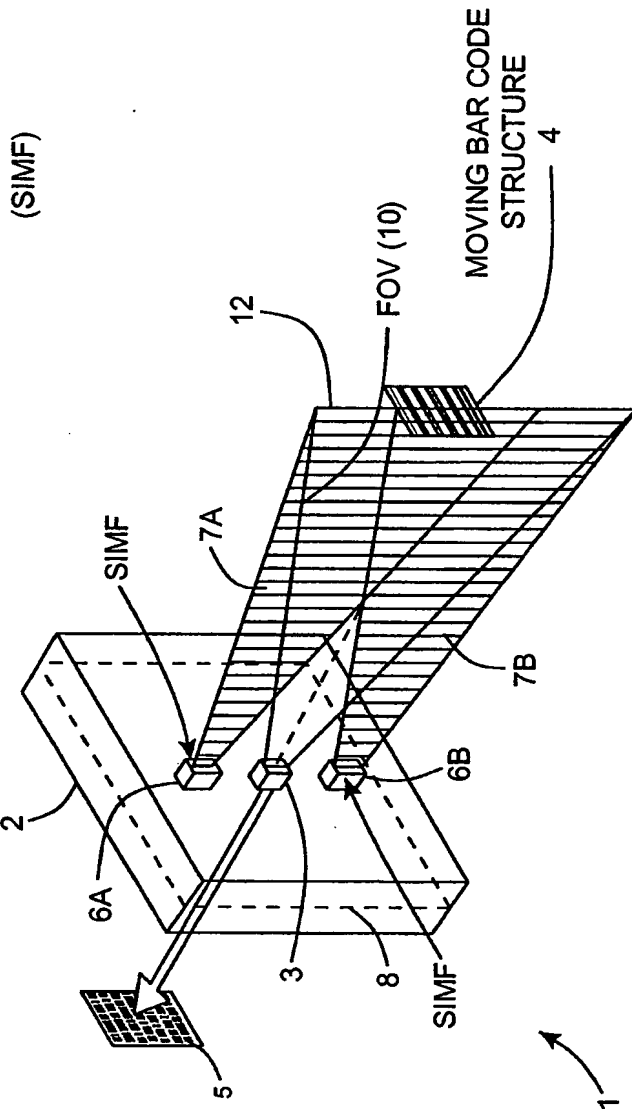


FIG. 1120

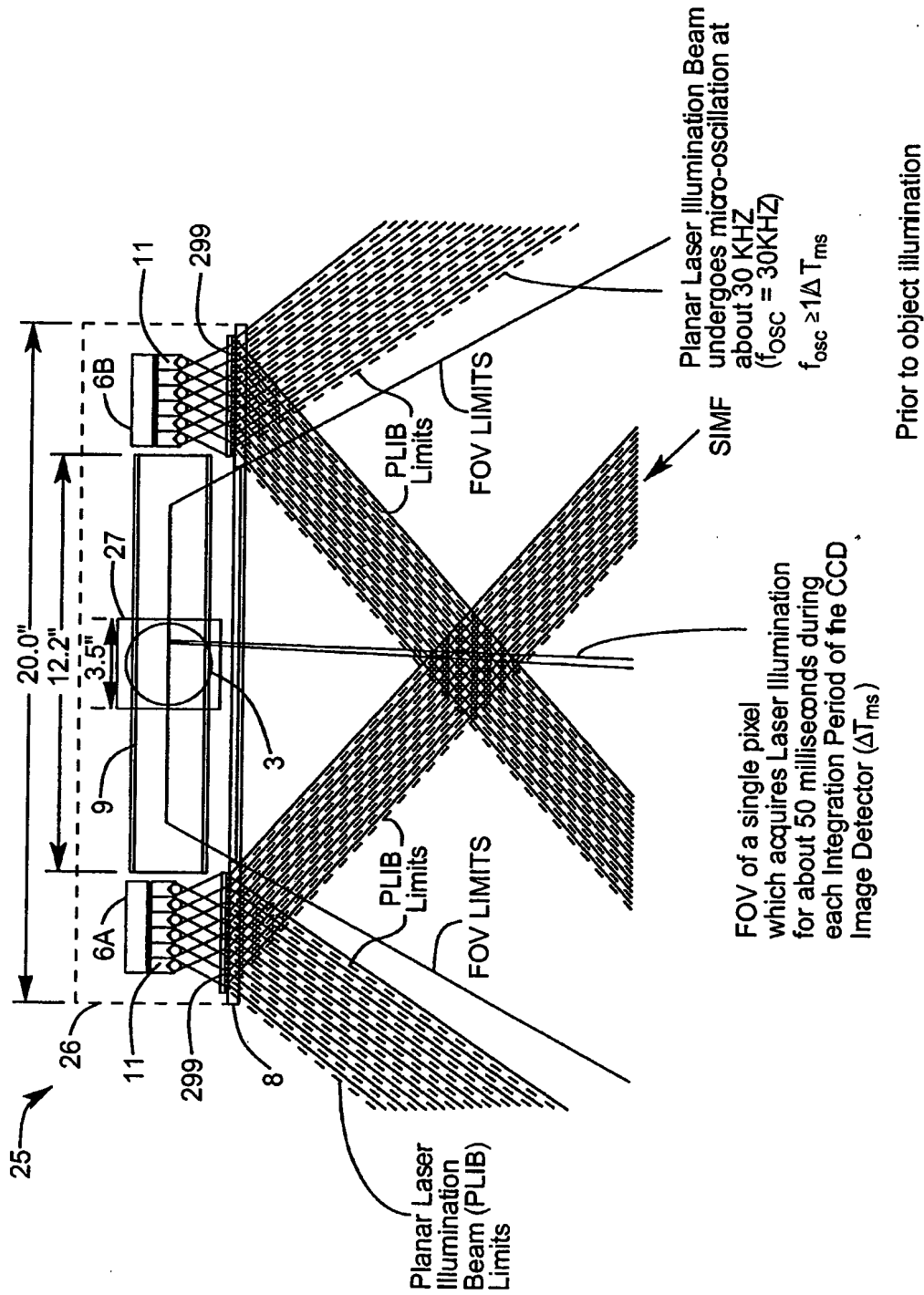


FIG. 1120A

THE FIFTH GENERALIZED SPECKLE-NOISE PATTERN REDUCTION
METHOD OF THE PRESENT INVENTION

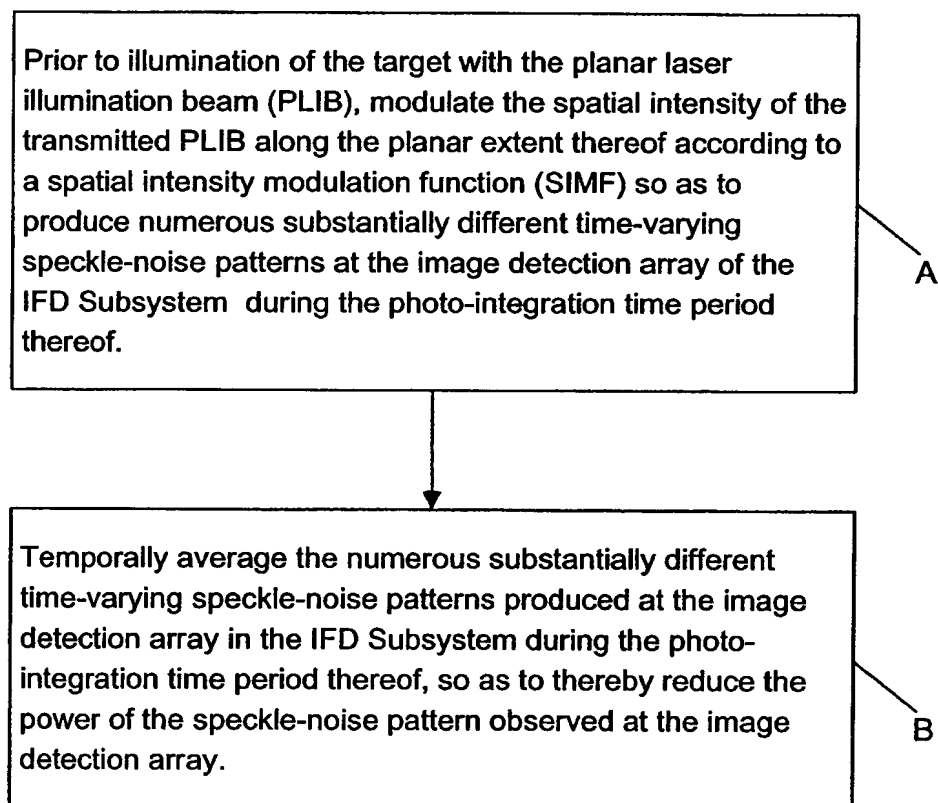
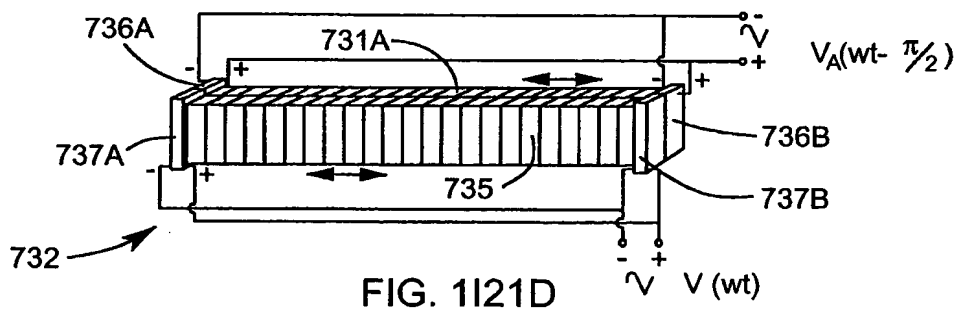
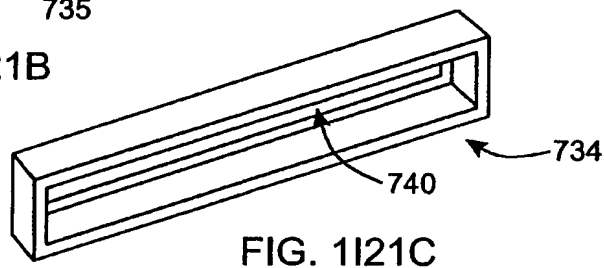
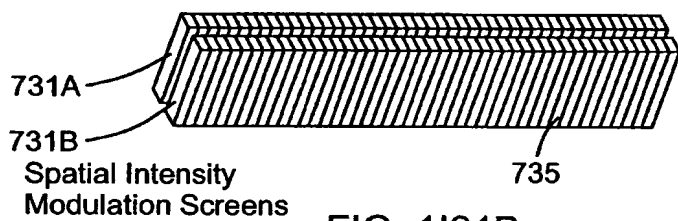
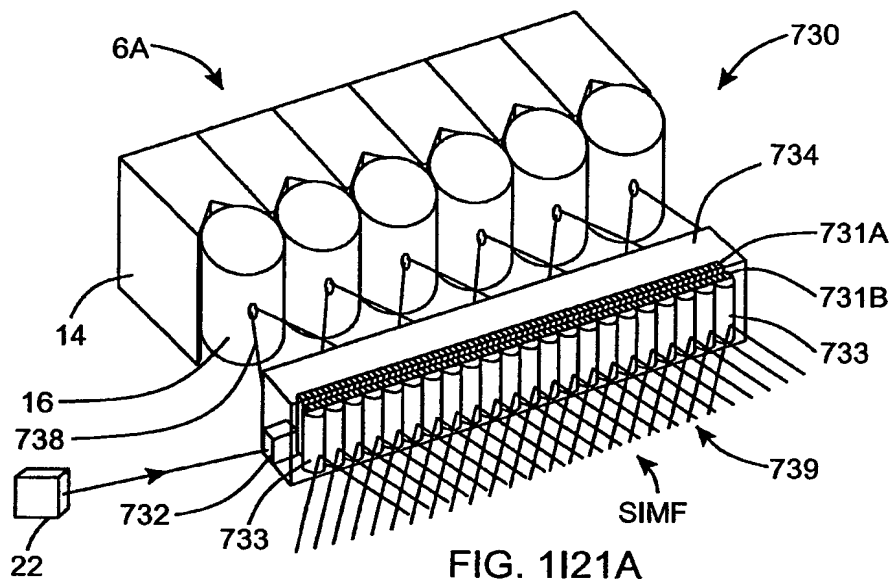


FIG. 1120B

200004929007



Sixth Generalized Method Of
Reducing Speckle-Noise Patterns
At Image Detection Array
Of The IFD Subsystem (3)

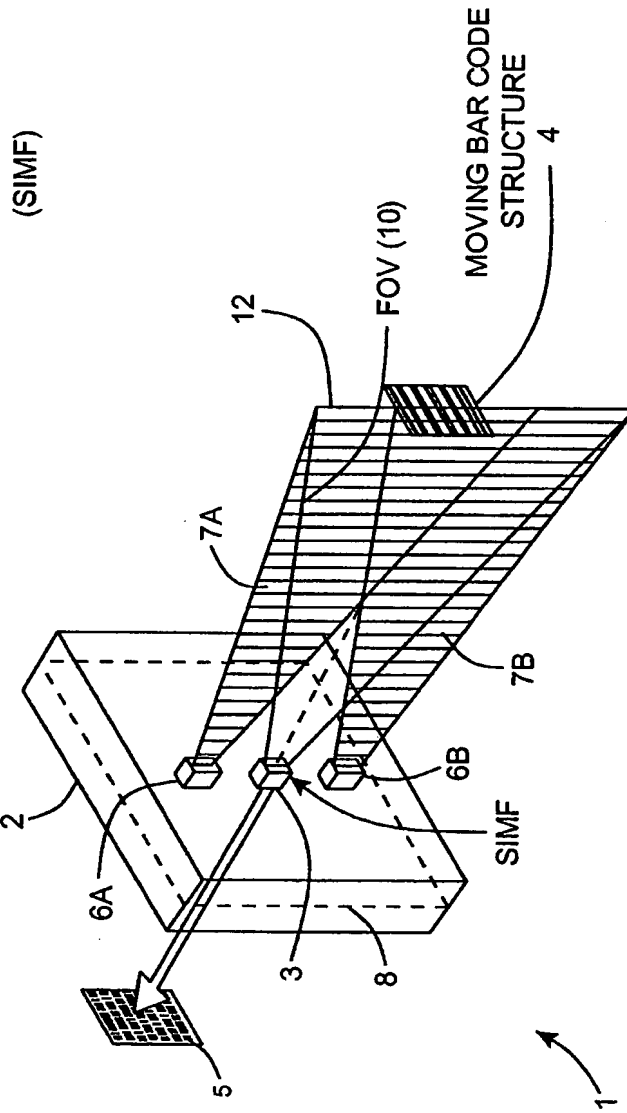


FIG. 1122

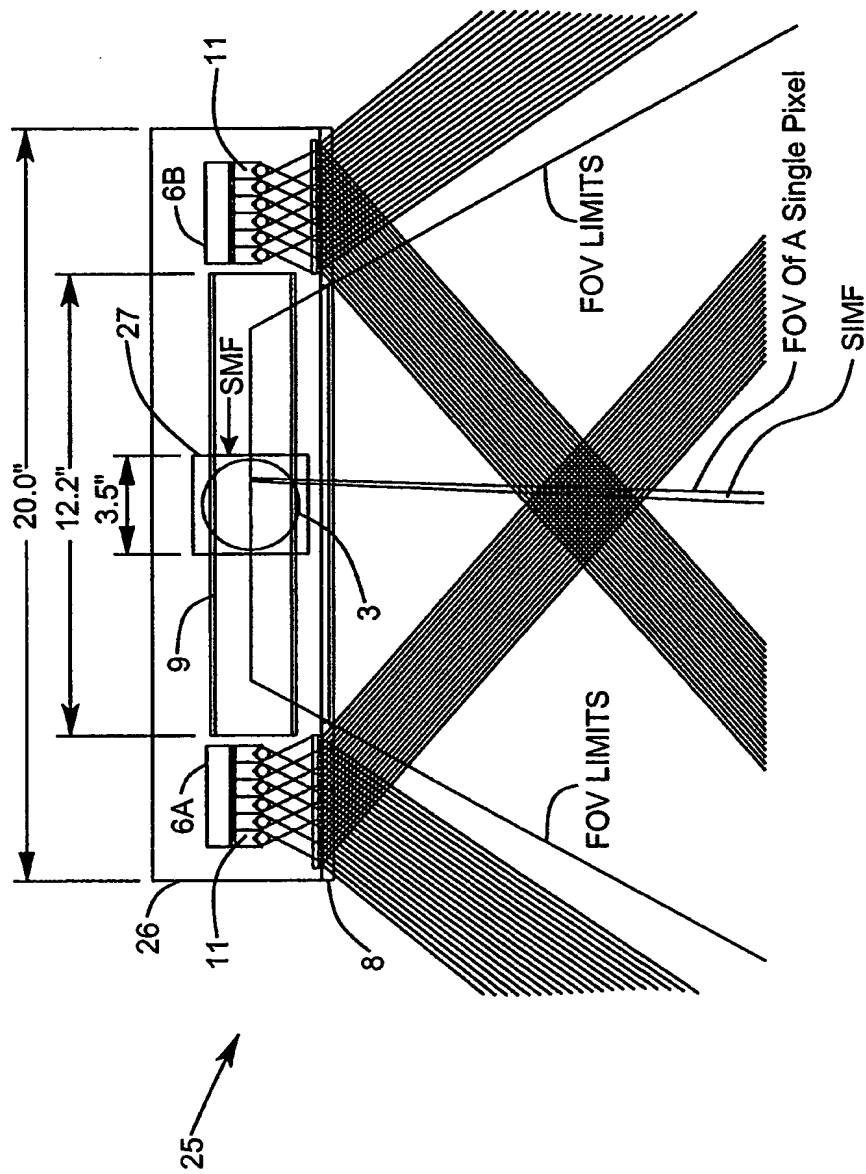


FIG. 1122A

THE SIXTH GENERALIZED SPECKLE-NOISE PATTERN REDUCTION
METHOD OF THE PRESENT INVENTION

After illumination of the target with the planar laser illumination beam (PLIB), modulate the spatial intensity of the reflected/scattered (i.e. received) PLIB along the planar extent thereof according to a spatial intensity modulation function (SIMF) so as to produce numerous substantially different time-varying speckle-noise patterns at the image detection array of the IFD Subsystem during the photo-integration time period thereof.

A

Temporally average the many substantially different time-varying speckle-noise patterns produced at the image detection array in the IFD Subsystem during the photo-integration time period thereof, so as to thereby reduce the speckle-noise pattern observed at the image detection array.

B

FIG. 1122B

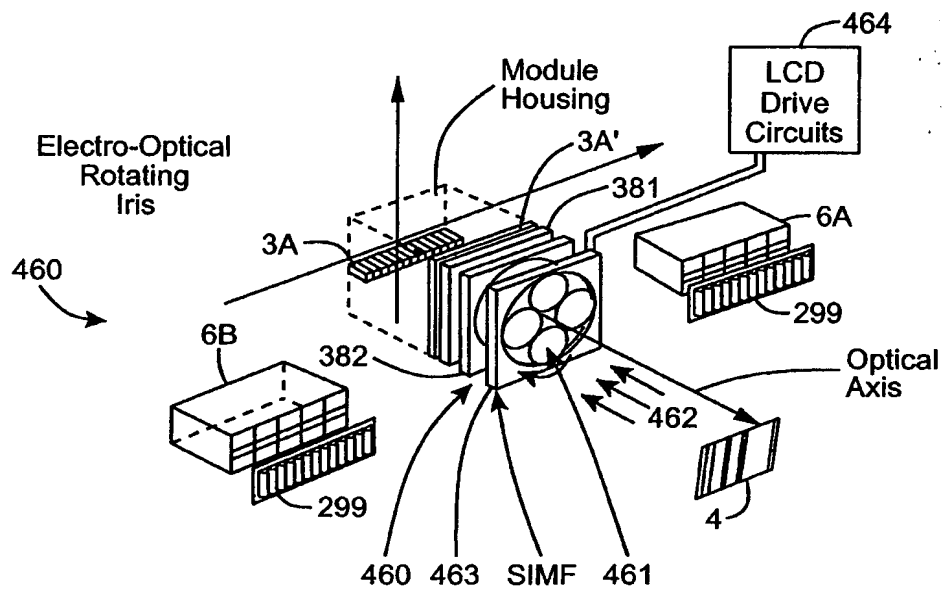


FIG. 1123A

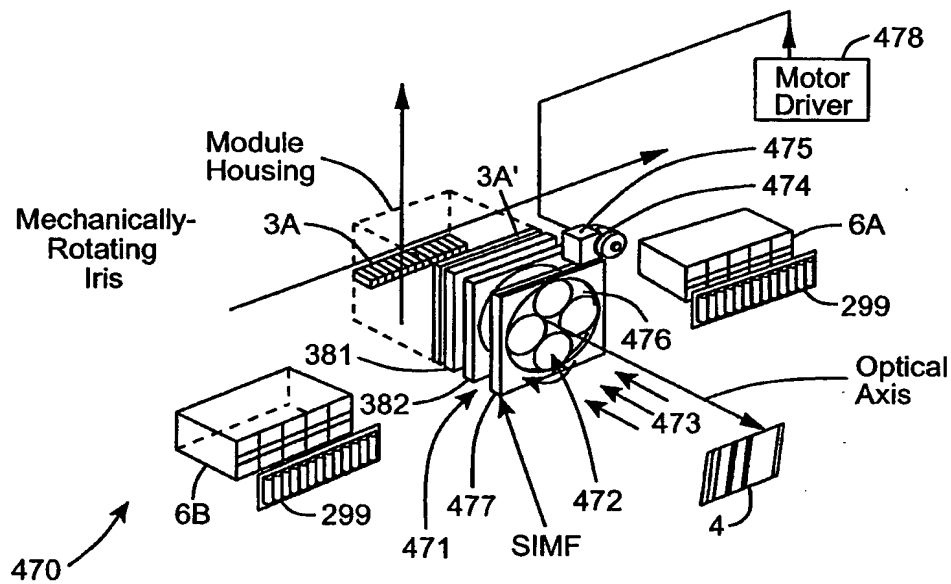


FIG. 1123B

Seventh Generalized Method Of
Reducing Speckle-Noise Patterns
At Image Detection Array
Of The IFD Subsystem (3).

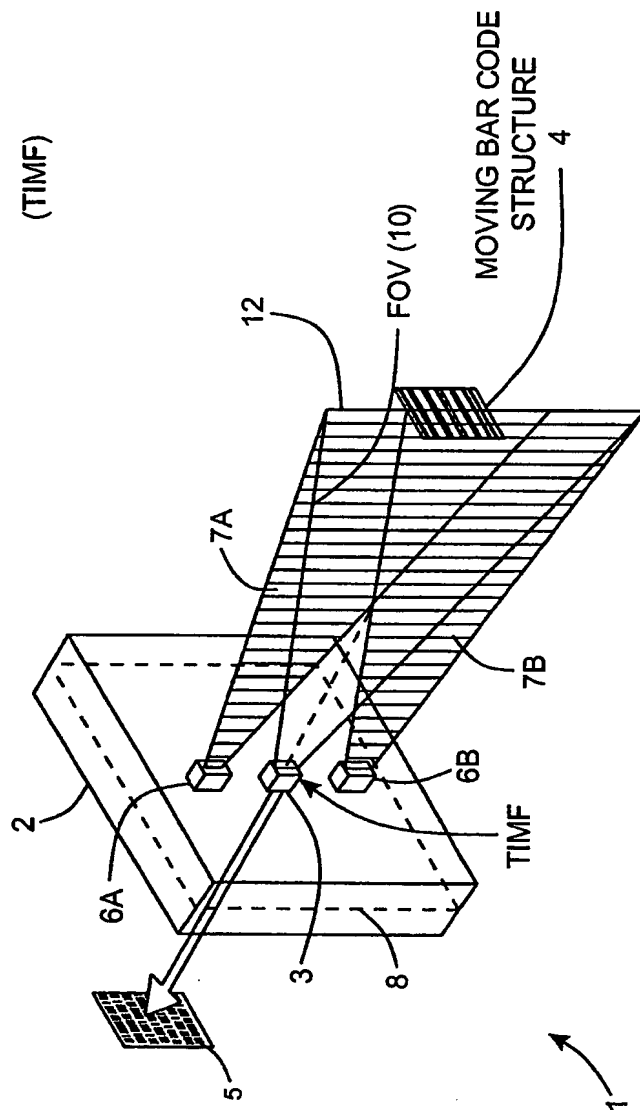


FIG. 1124

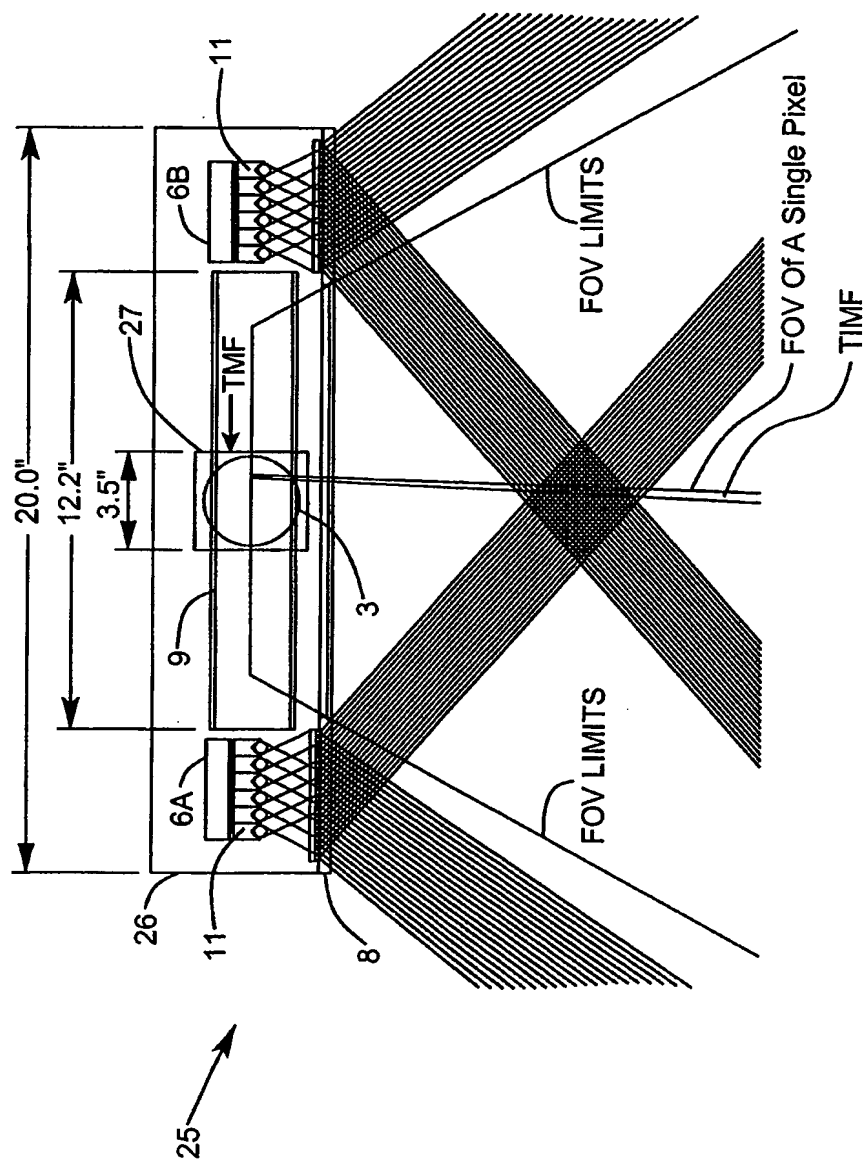


FIG. 1124A

THE SEVENTH GENERALIZED SPECKLE-NOISE PATTERN REDUCTION
METHOD OF THE PRESENT INVENTION

After illumination of the target with the planar laser illumination beam (PLIB), modulate the temporal intensity of the reflected/scattered (i.e. received) PLIB along the planar extent thereof according to a temporal intensity modulation function (TIMF) so as to produce many substantially different time-varying speckle-noise patterns at the image detection array of the IFD Subsystem during the photo-integration time period thereof.

A

Temporally average the many substantially different time-varying speckle-noise patterns produced at the image detection array in the IFD Subsystem during the photo-integration time period thereof, so as to thereby reduce the speckle-noise pattern observed at the image detection array.

B

FIG. 1124B

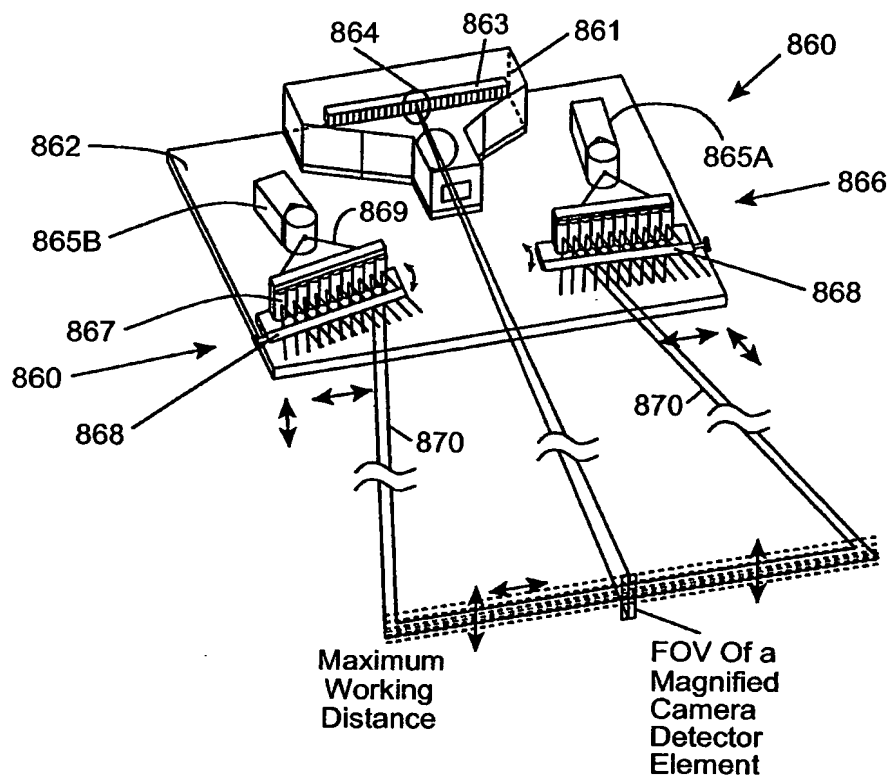


FIG. 1I25A1

* Lateral And Transverse Micro-oscillation Of PLIB

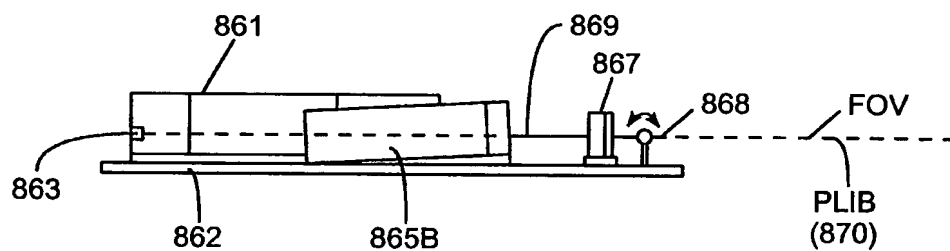


FIG. 1I25A2

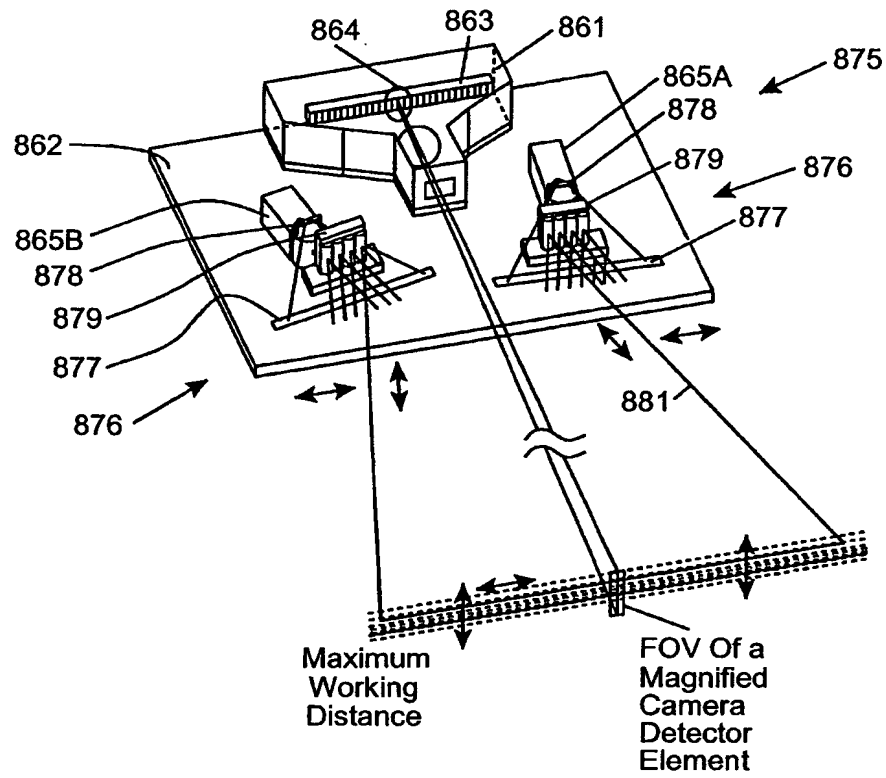


FIG. 1125B1

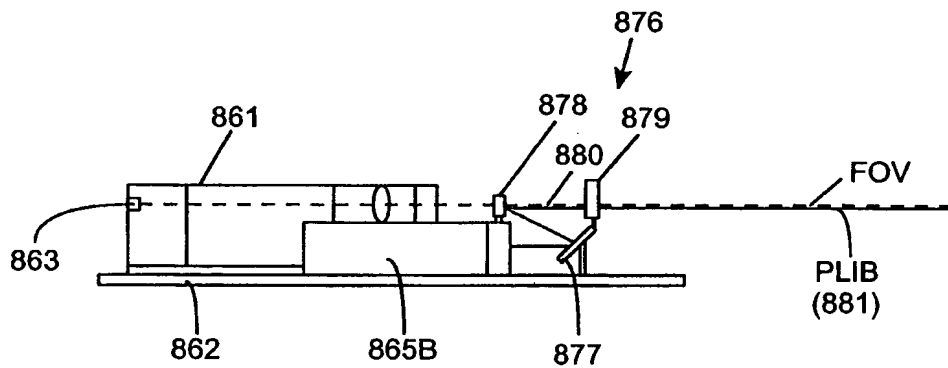
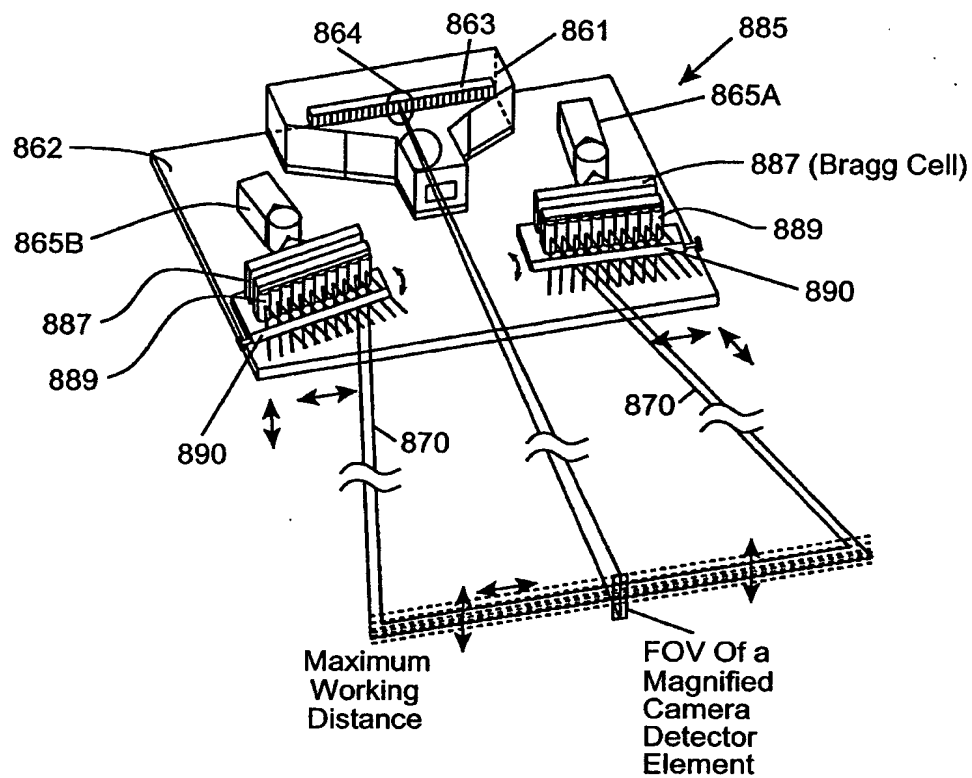


FIG. 1125B2



* Lateral And
Transverse
Micro-oscillation
Of PLIB

FIG. 1I25C1

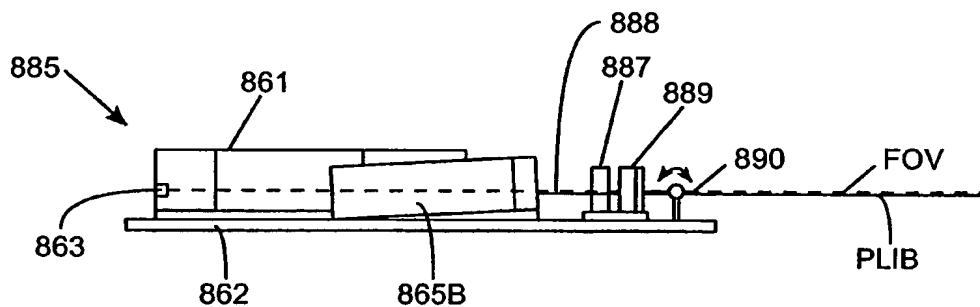


FIG. 1I25C2

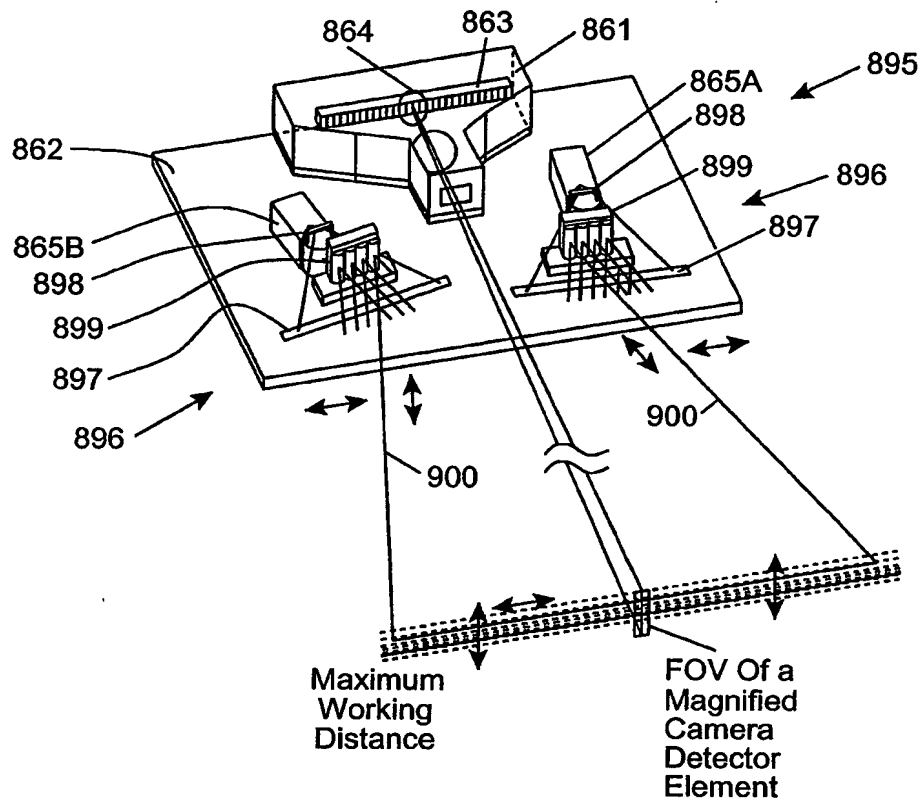


FIG. 1125D1

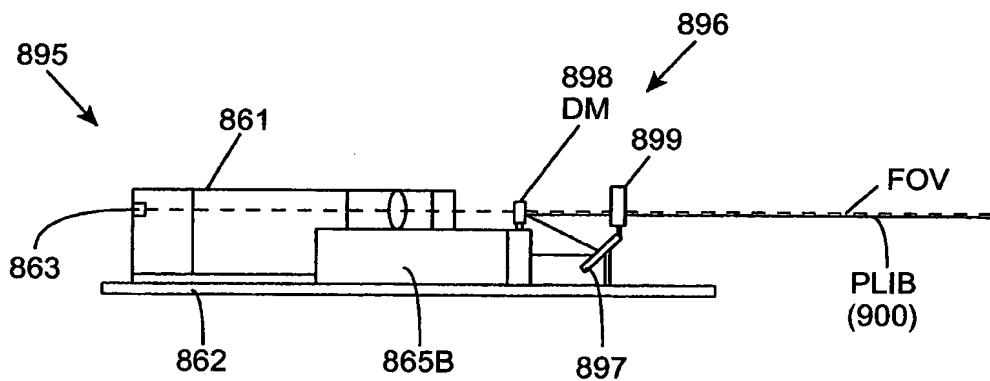


FIG. 1125D2

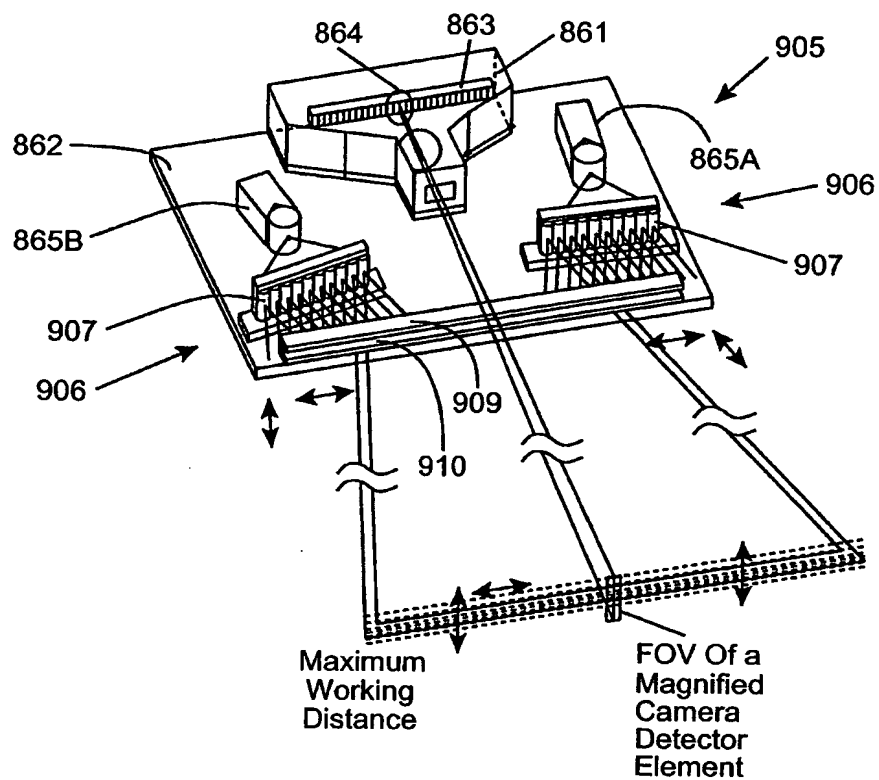


FIG. 1125E1

* Lateral And Transverse Micro-oscillation Of PLIB

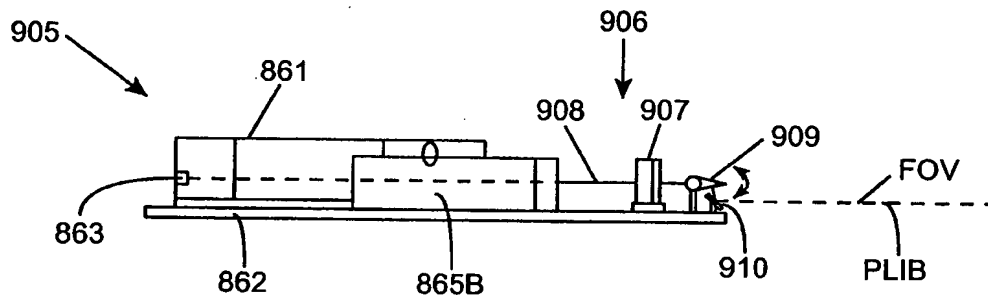


FIG. 1125E2

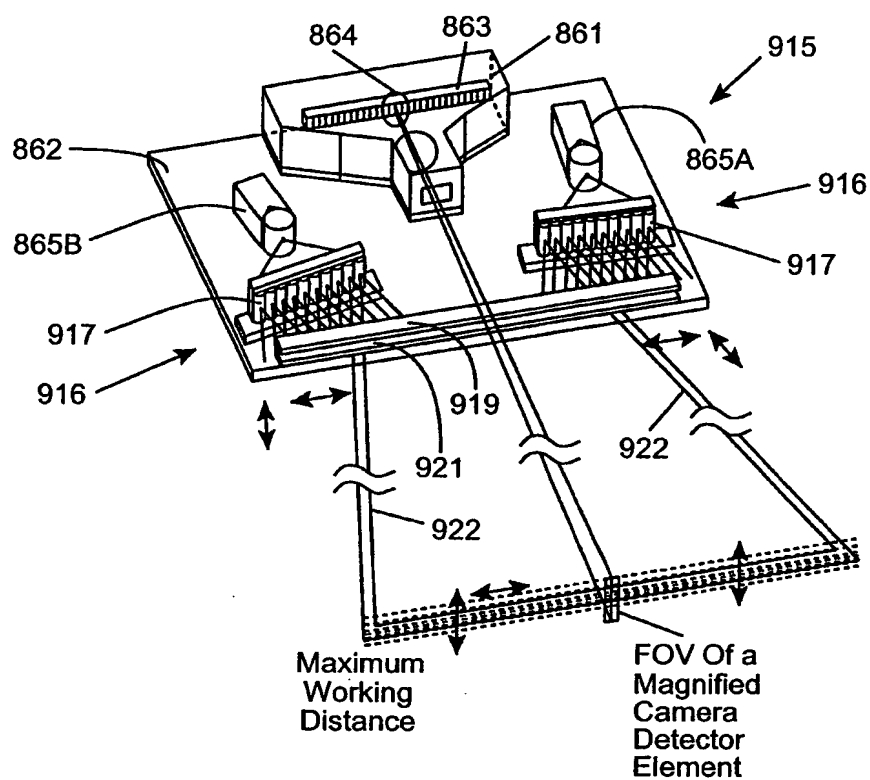


FIG. 1I25F1

* Lateral And Transverse Micro-oscillation Of PLIB

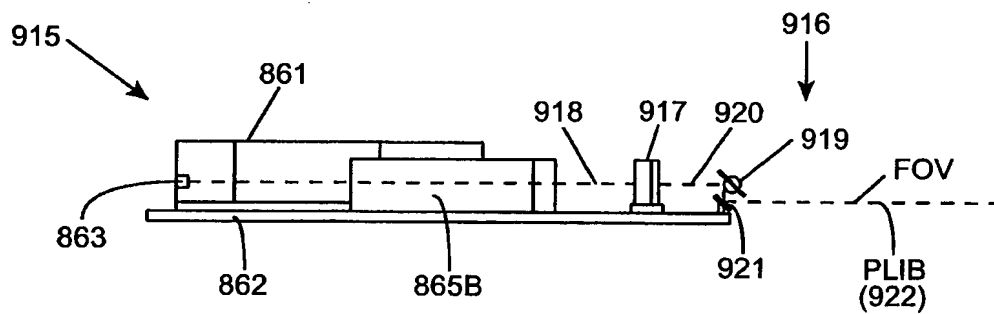
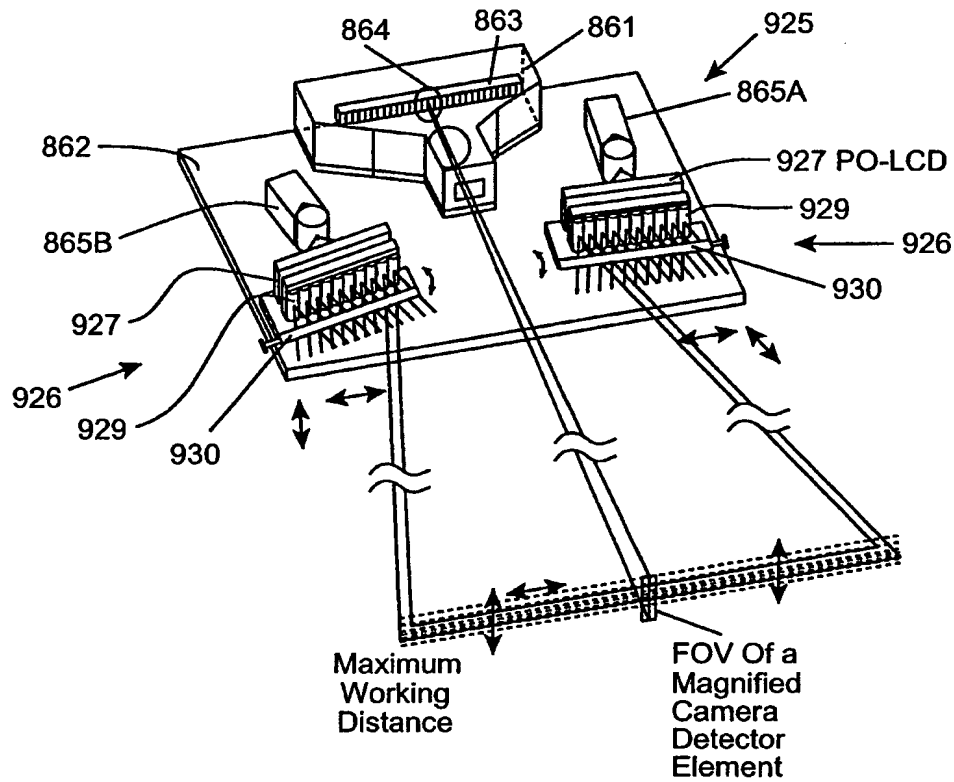


FIG. 1I25F2



* Lateral And
Transverse
Micro-oscillation
Of PLIB

FIG. 1125G1

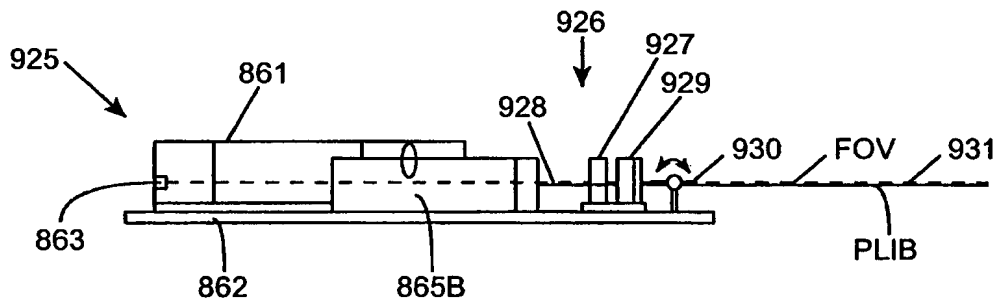


FIG. 1125G2

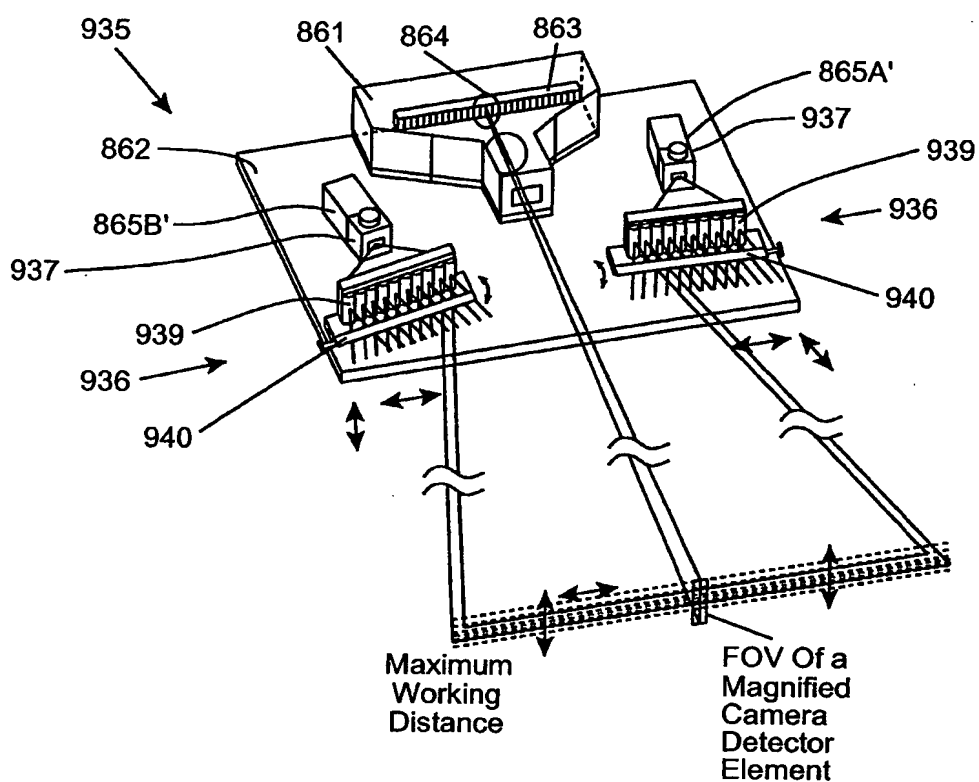


FIG. 1I25H1

* Lateral And Transverse Micro-oscillation Of PLIB

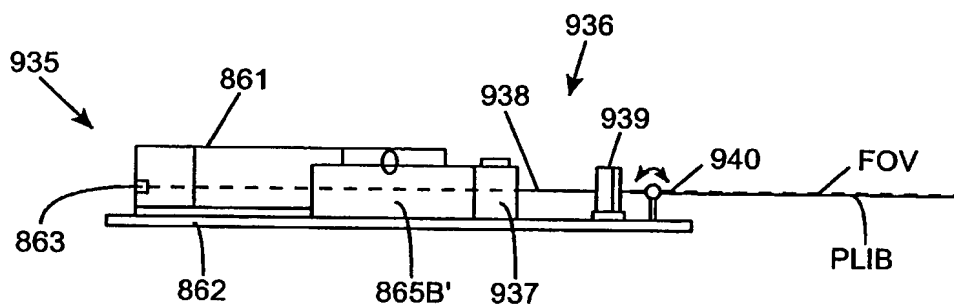
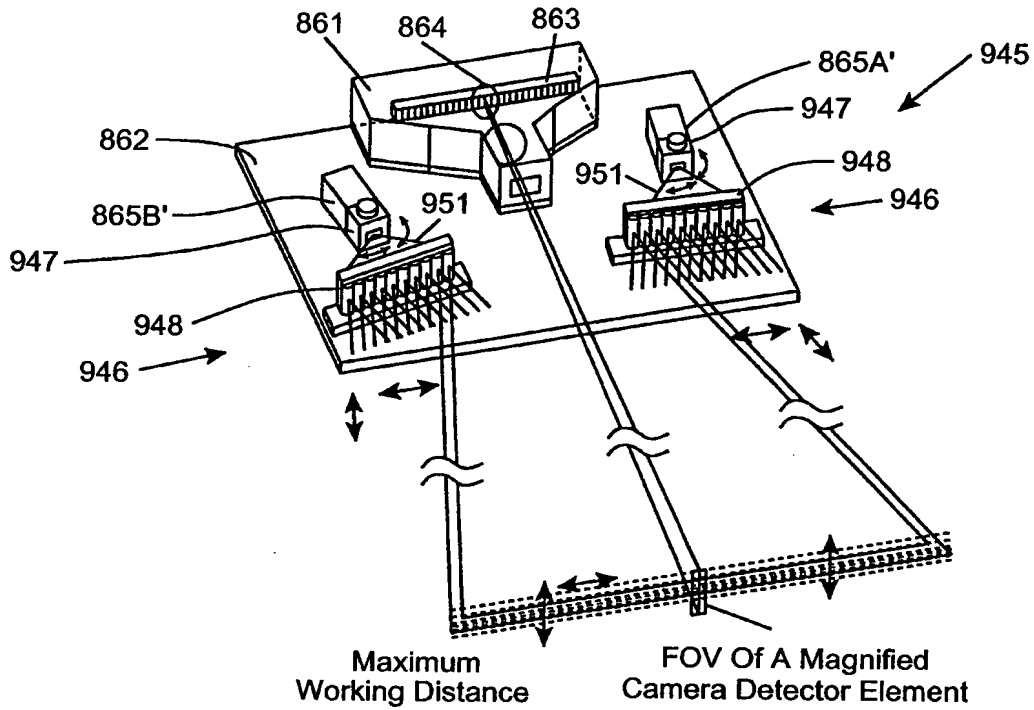
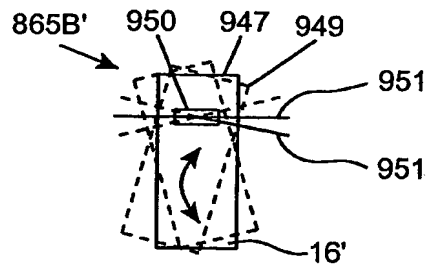
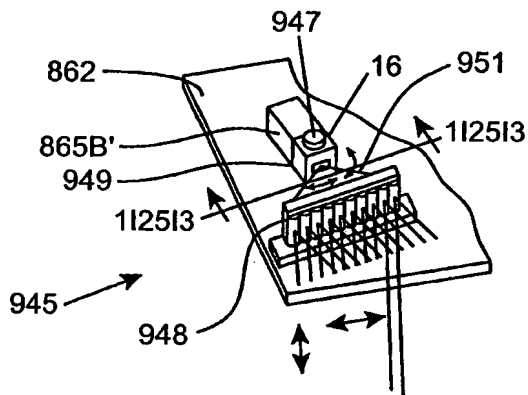
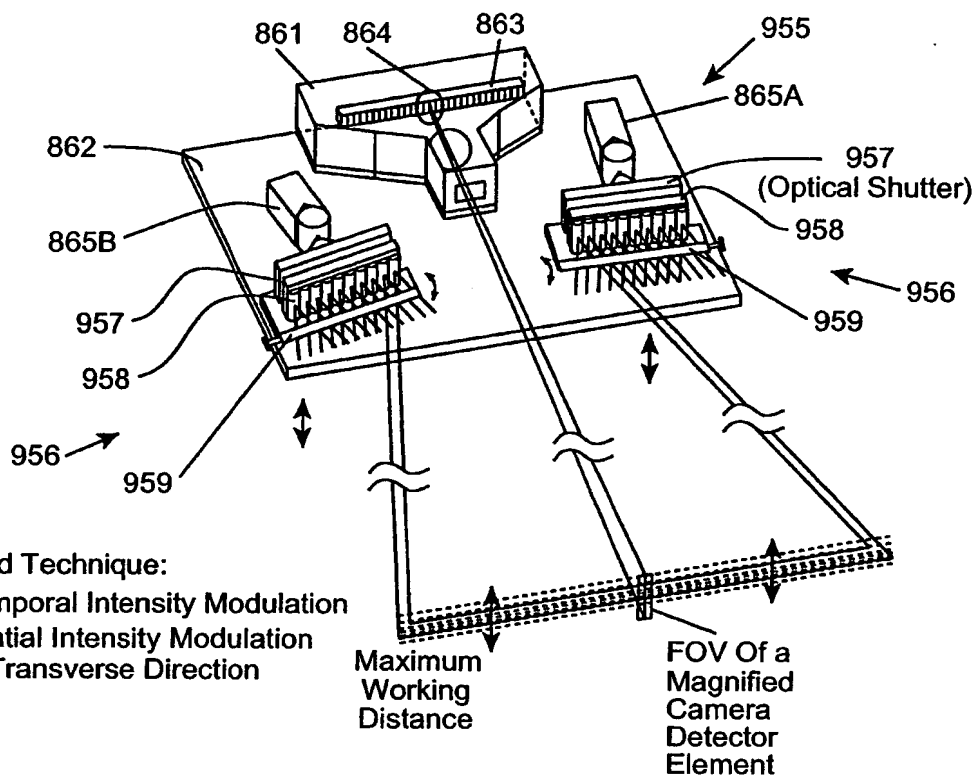


FIG. 1I25H2



* Lateral And Transverse Micro-oscillation Of PLIB





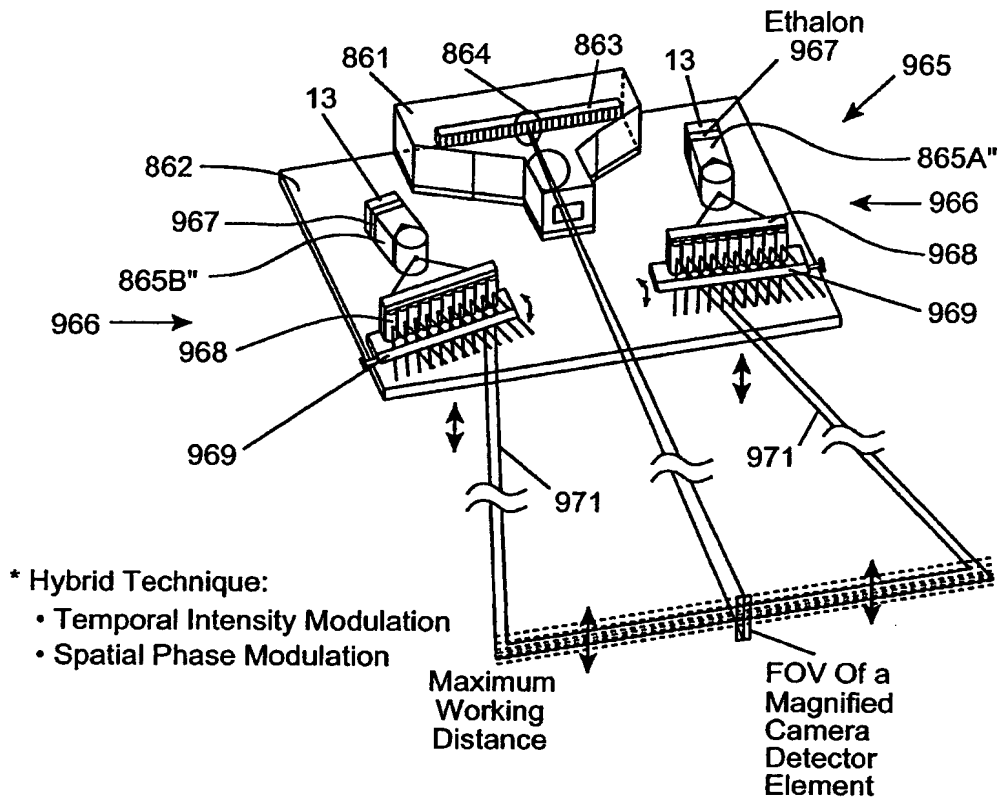


FIG. 1I25K1

* Transverse Micro-oscillation Of PLIB

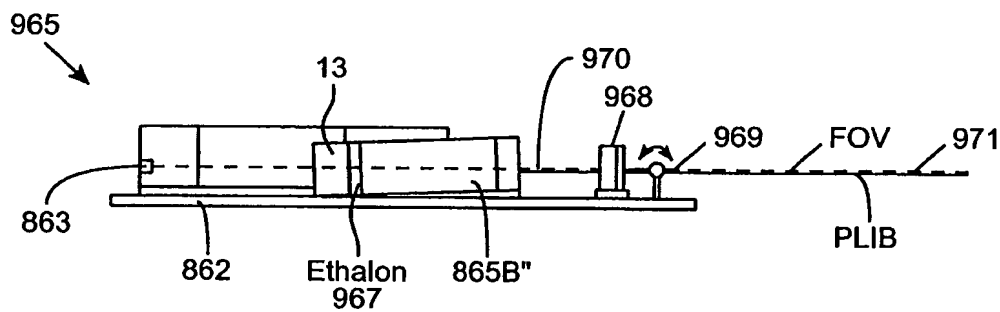
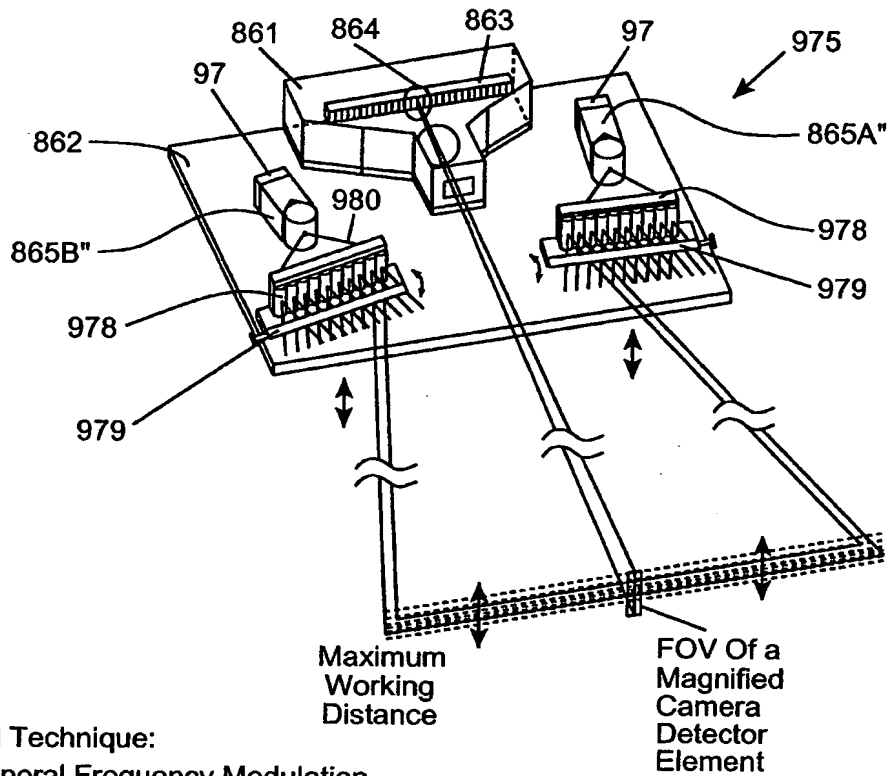


FIG. 1I25K2



- * Hybrid Technique:
- Temporal Frequency Modulation
 - Spatial Phase Modulation

- * Transverse Micro-oscillation Of PLIB

FIG. 1I25L1

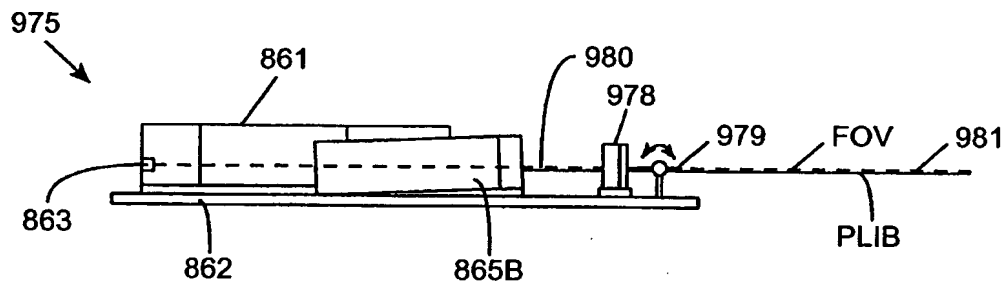
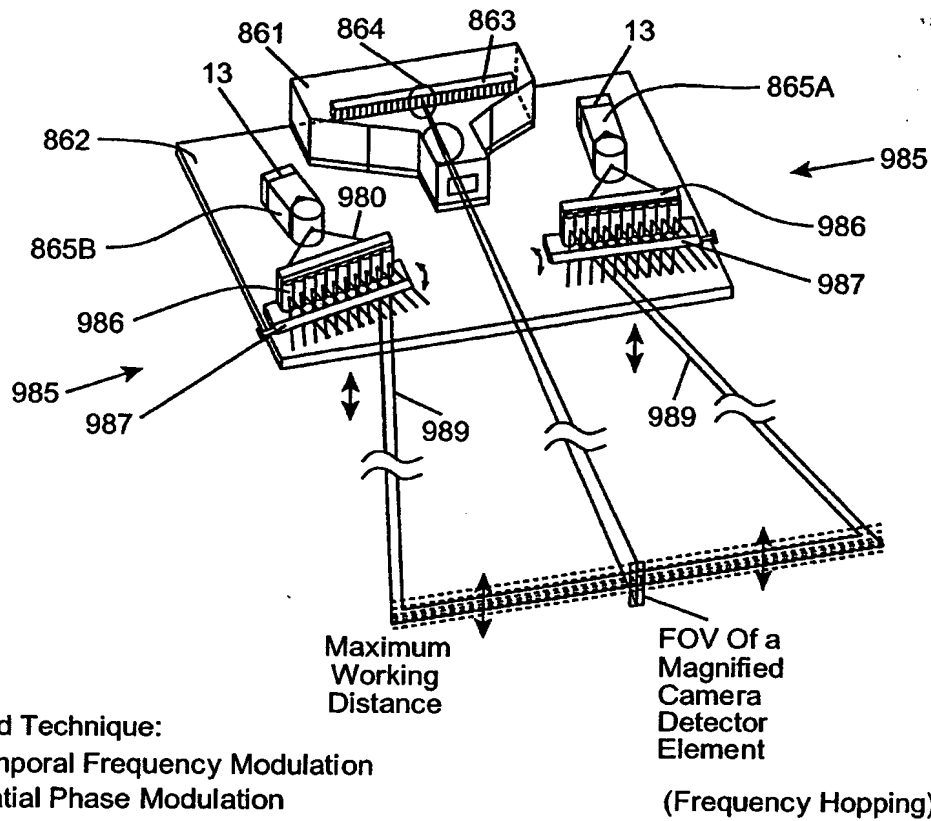


FIG. 1I25L2



* Hybrid Technique:

- Temporal Frequency Modulation
- Spatial Phase Modulation

FIG. 1I25M1

* Transverse Micro-oscillation Of PLIB

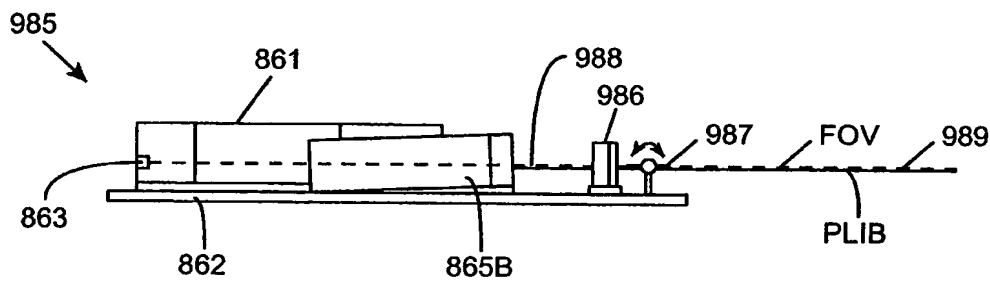
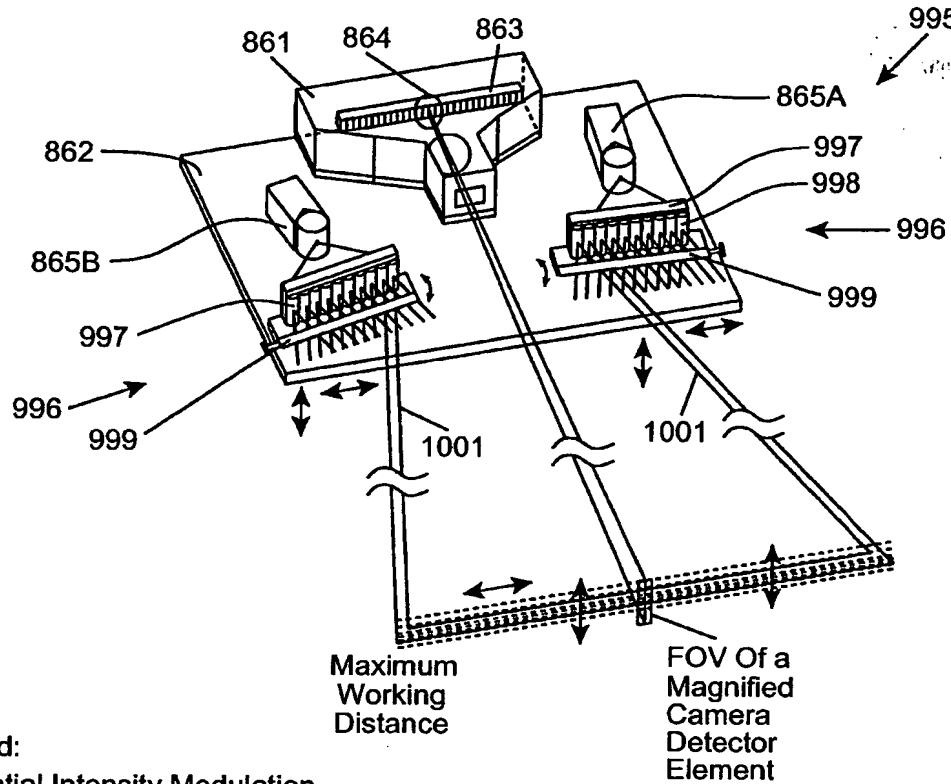


FIG. 1I25M2



- * Hybrid:
- Spatial Intensity Modulation
 - Spatial Phase Modulation

- * Lateral And Transverse Micro-oscillation Of PLIB

FIG. 1I25N1

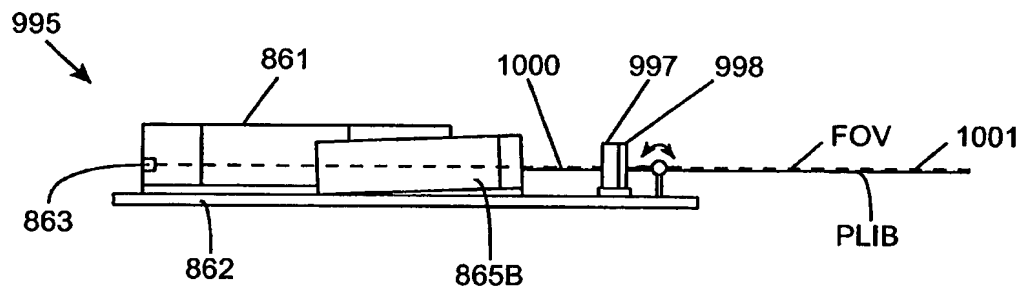


FIG. 1I25N2

200020 04929001

Fixed Focal Length
Lens Cases

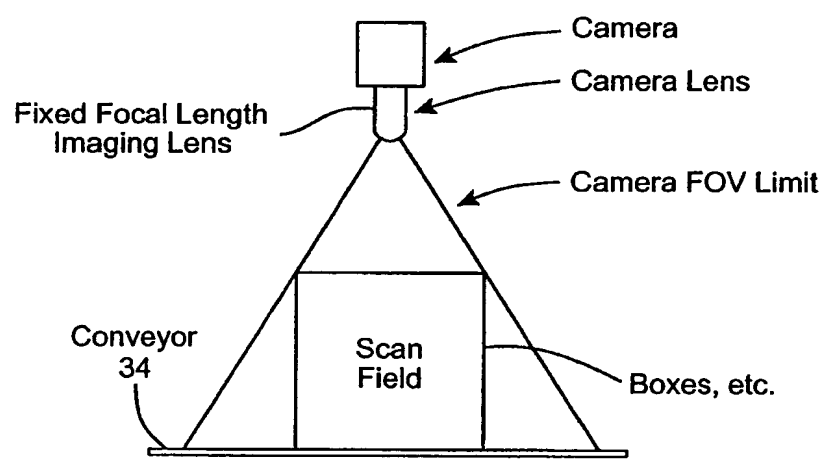


FIG. 1K1

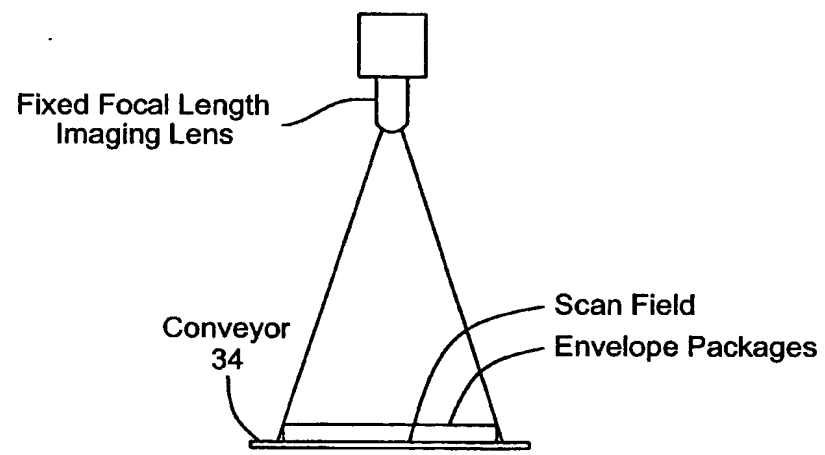


FIG. 1K2

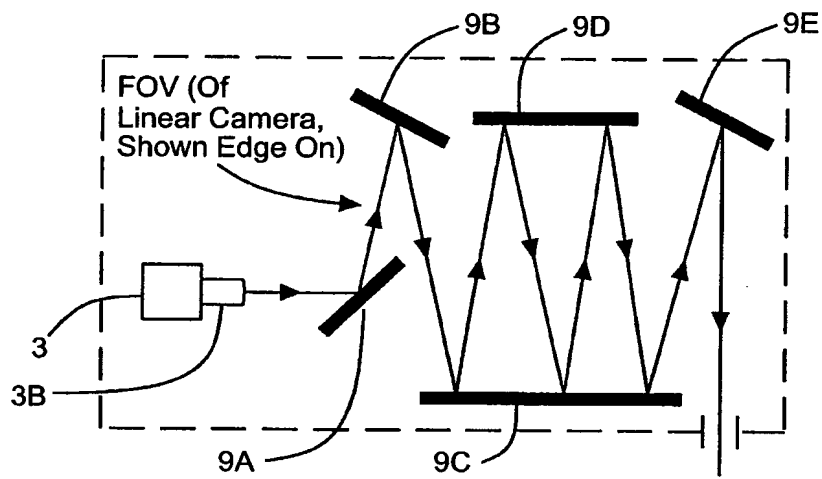


FIG. 1L1

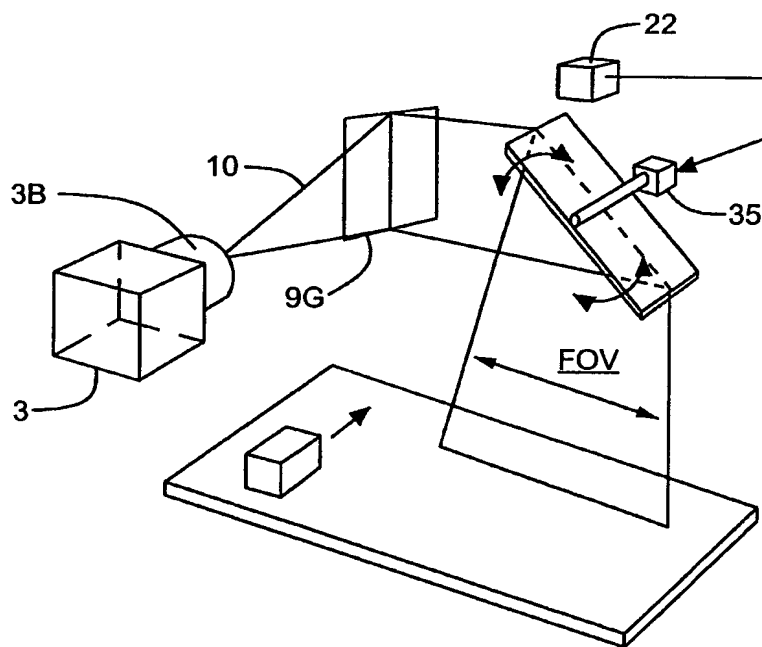


FIG. 1L2

Pixel Power Density vs. Object Distance (General Example)

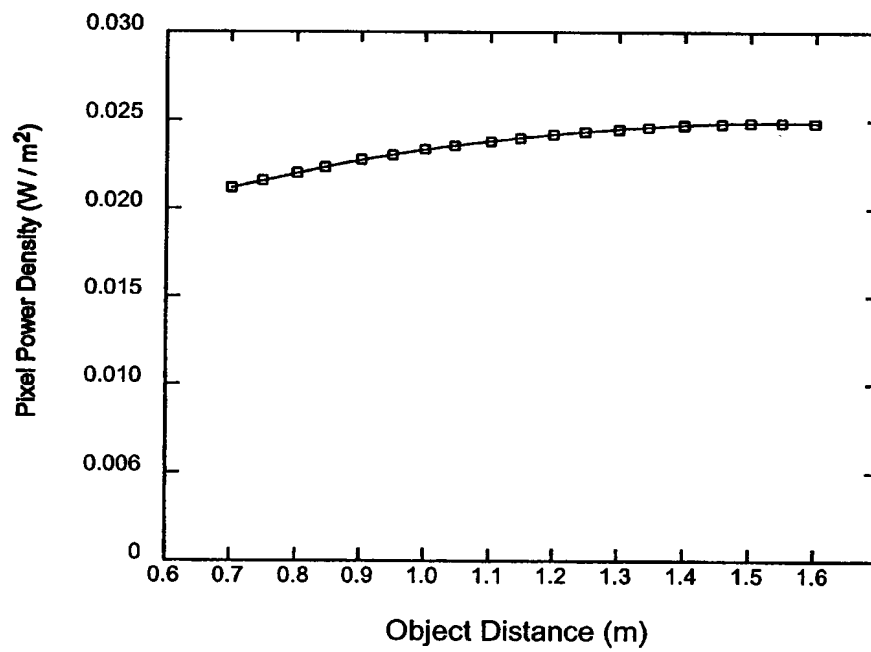


FIG. 1M1

20060207 04523007

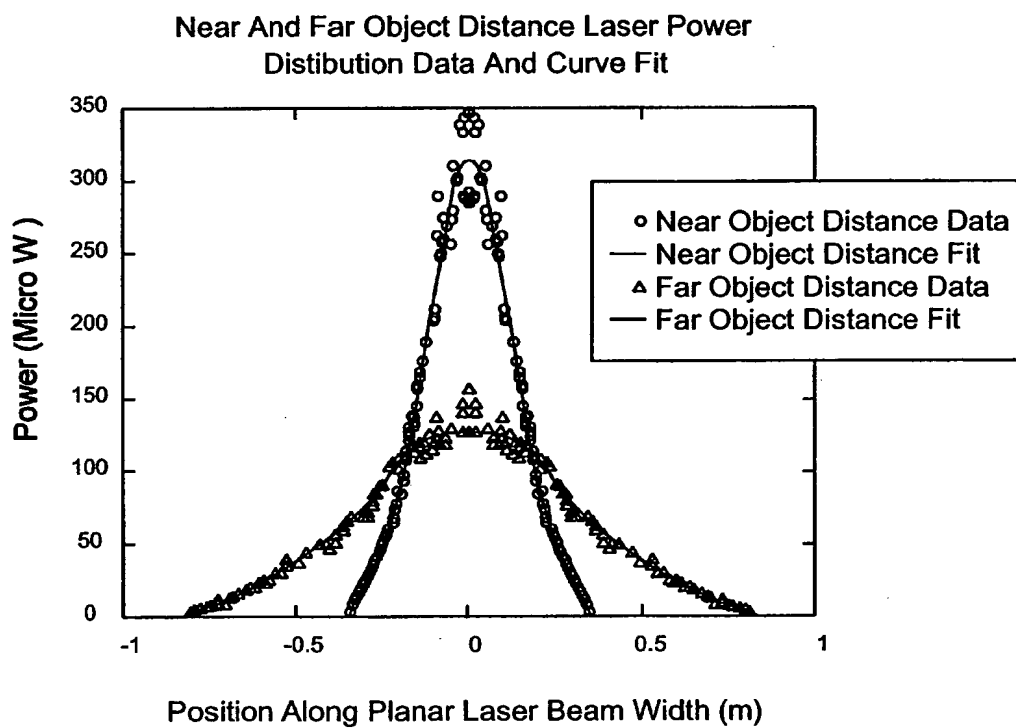


FIG. 1M2

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Planar Laser Beam Width vs. Object Distance

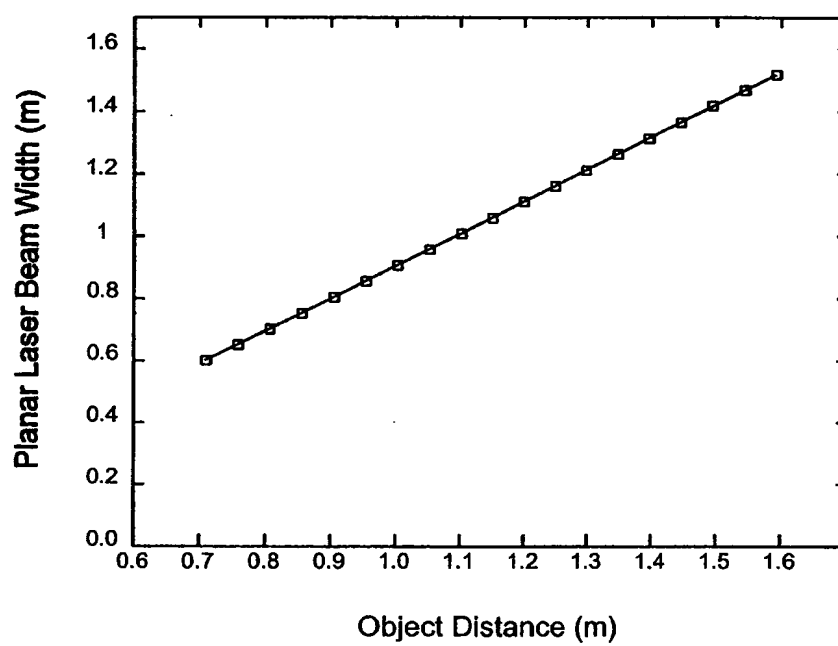


FIG. 1M3

20250701 01523001

Planar Laser Beam Height vs.
Object Distance (Far Object Distance Focus)

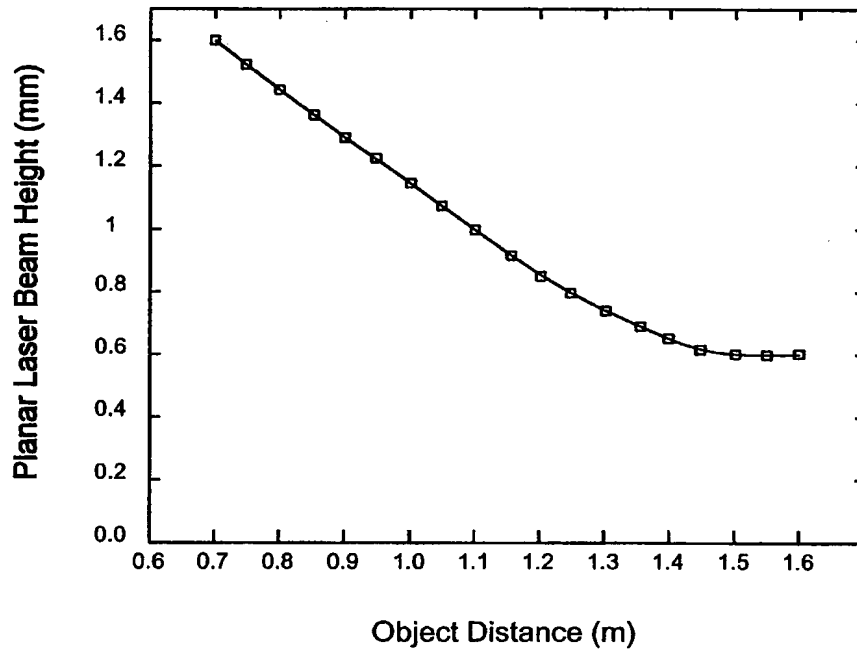


FIG. 1M4

206020 04523001

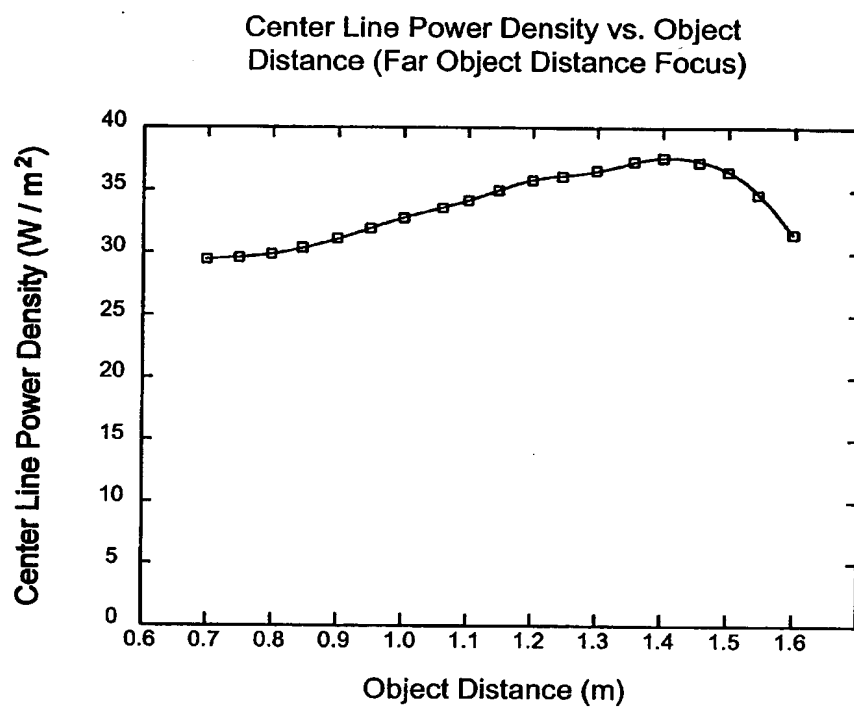


FIG. 1N

206020" 04569001

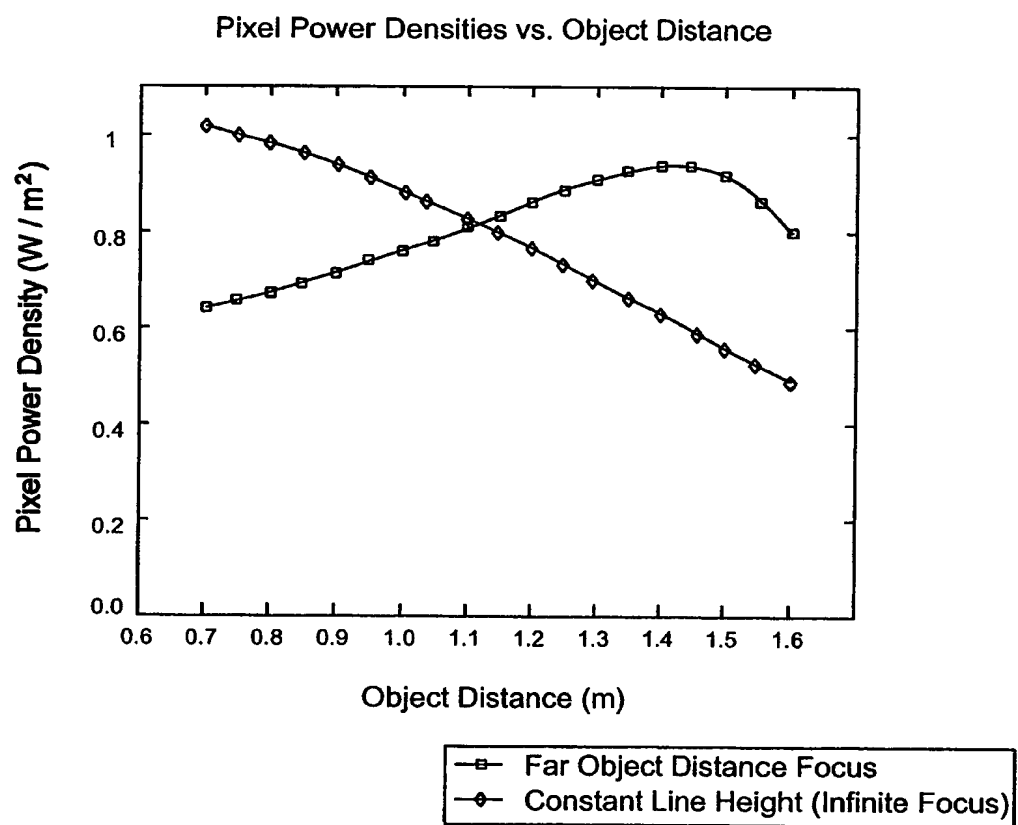


FIG. 10

206020 04923007

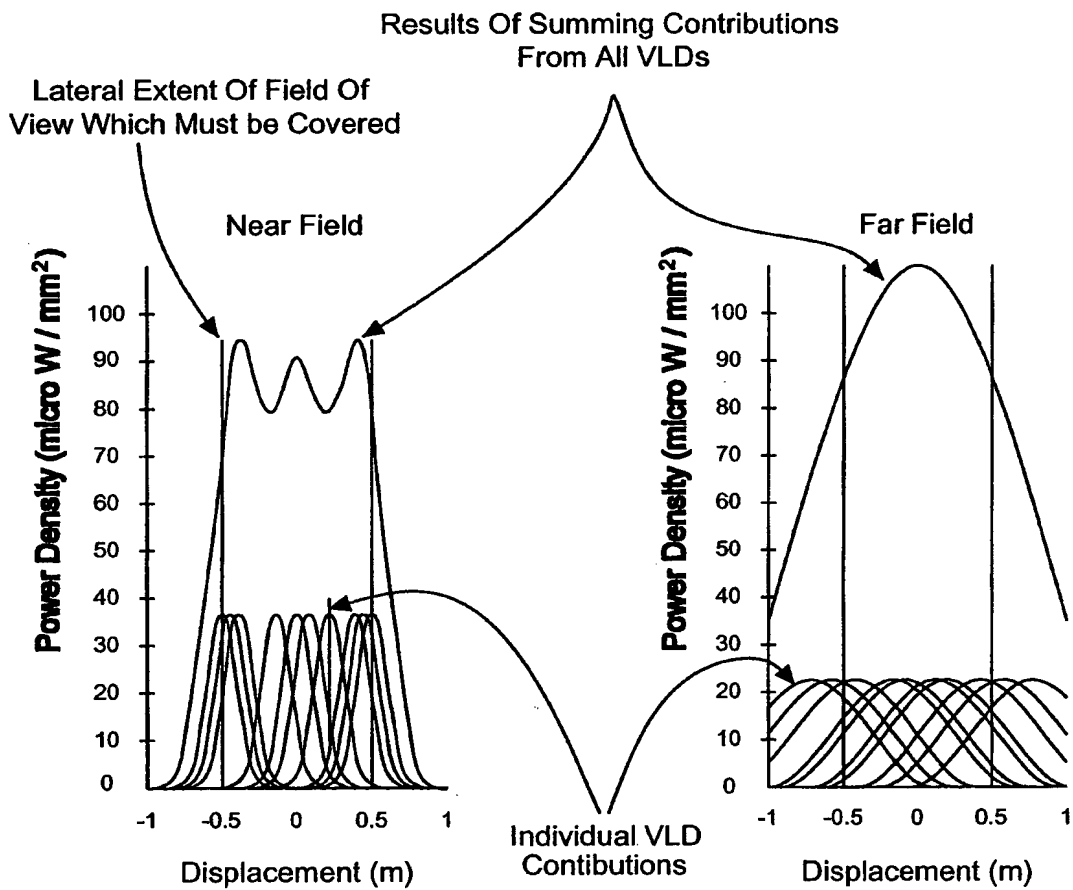




FIG. 1Q1

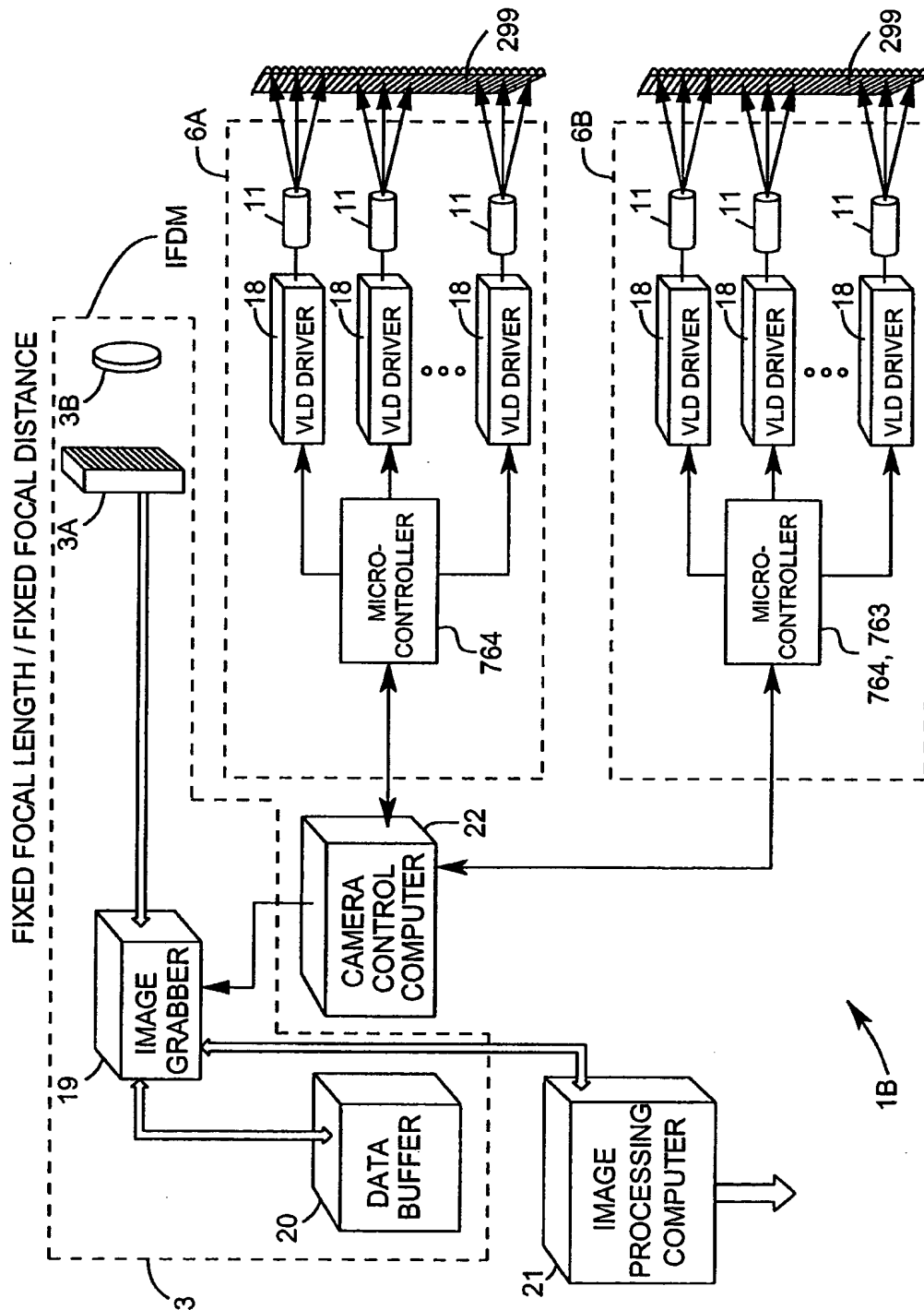


FIG. 1Q2

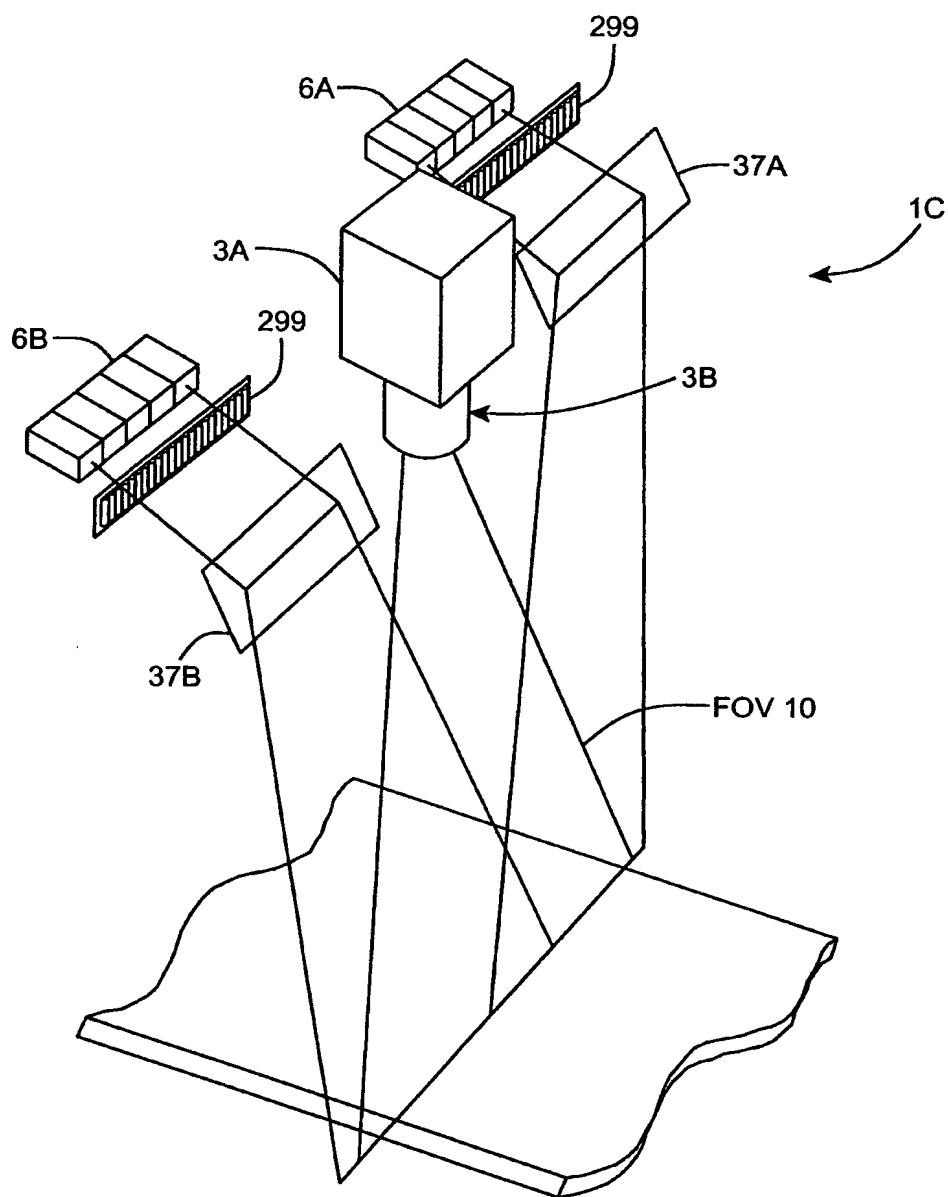


FIG. 1R1

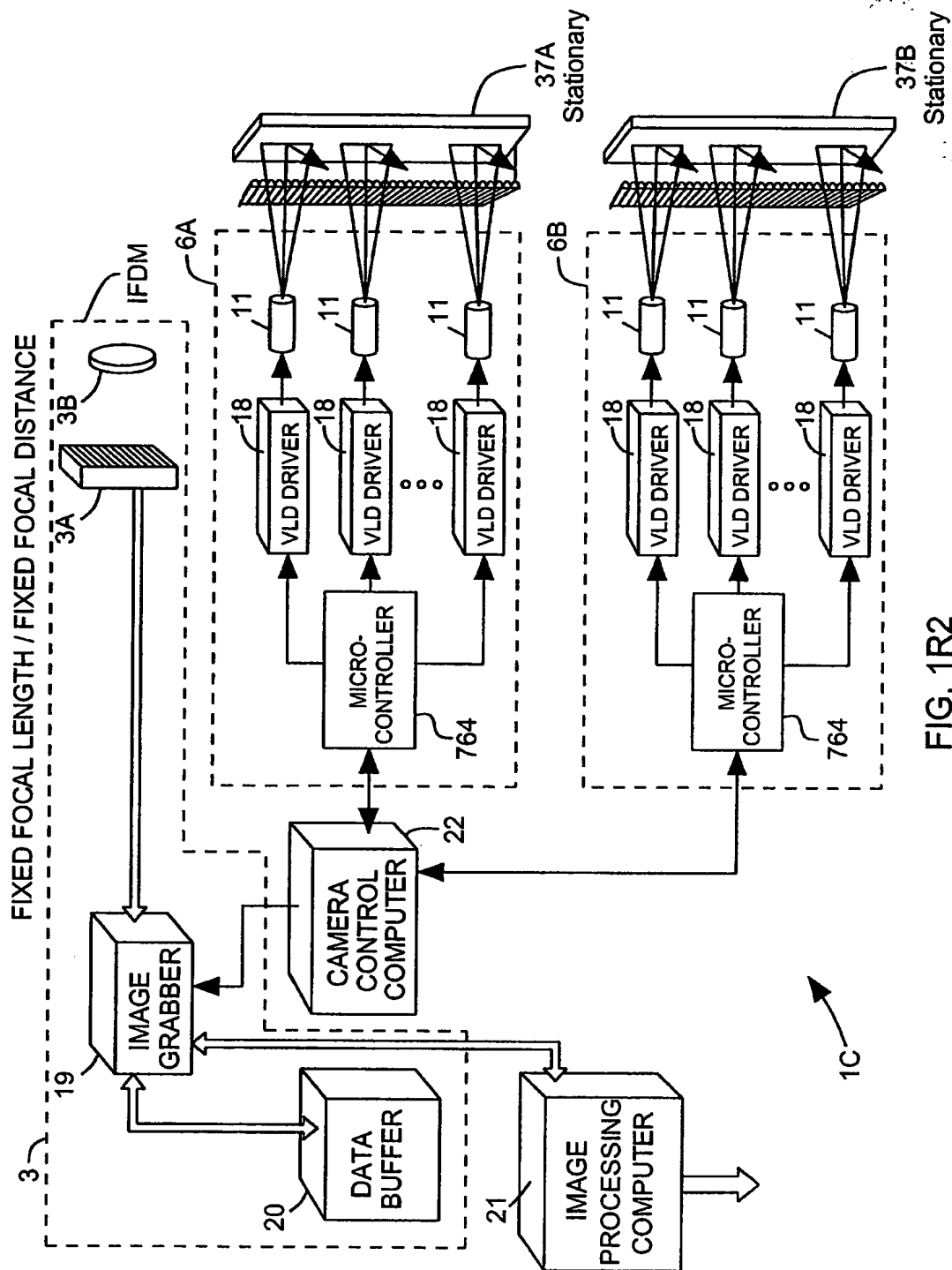


FIG. 1R2

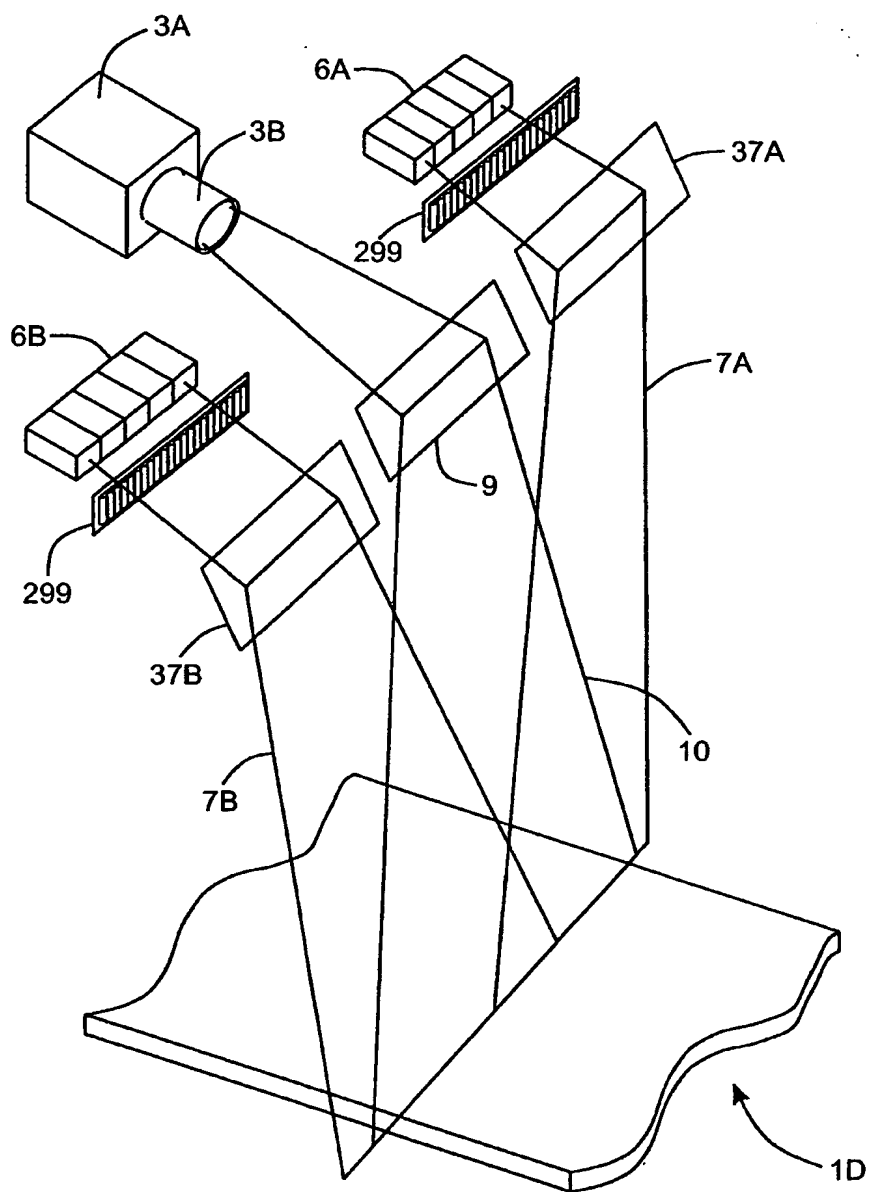


FIG. 1S1

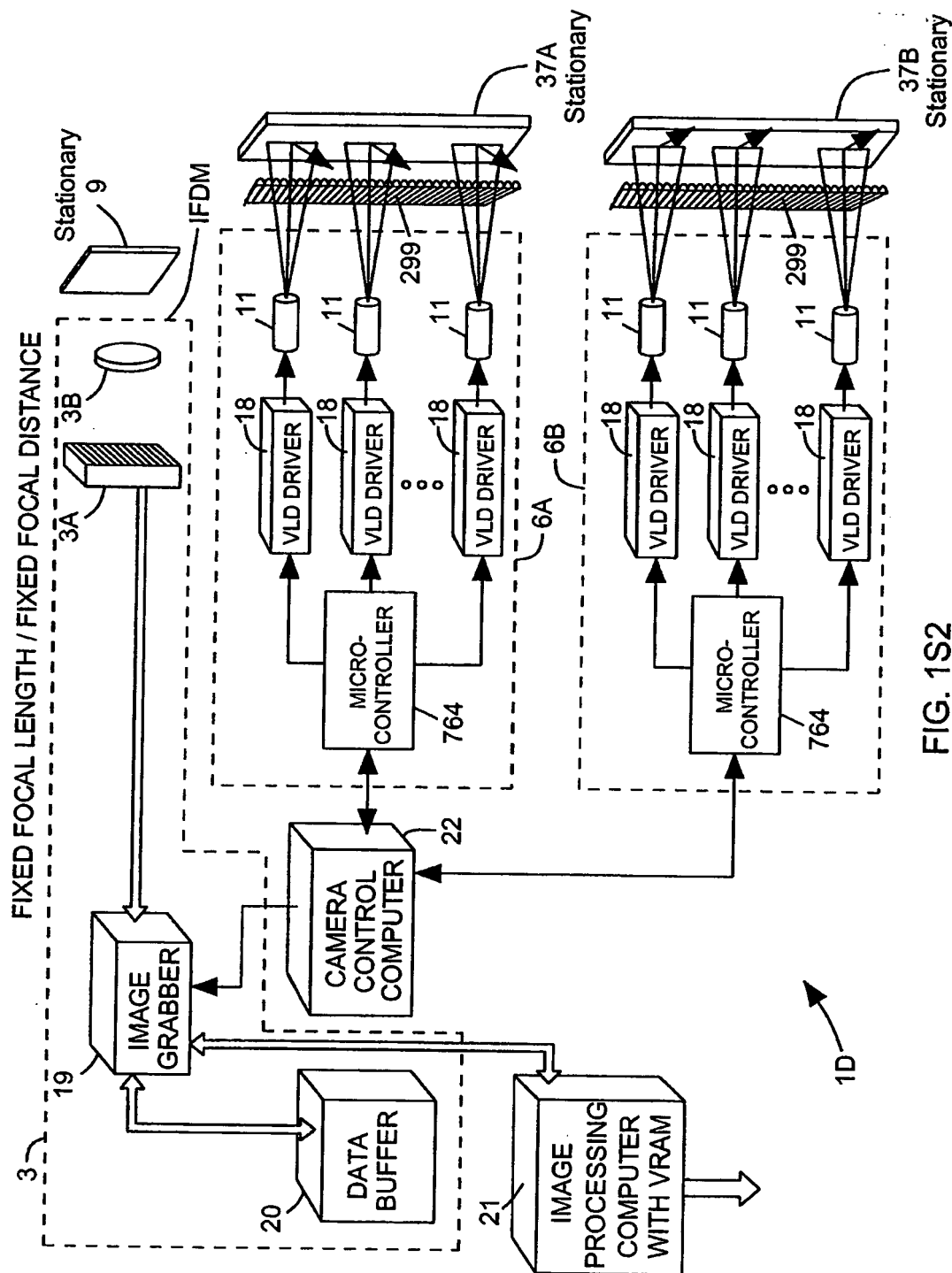


FIG. 1S2

2006040704929001

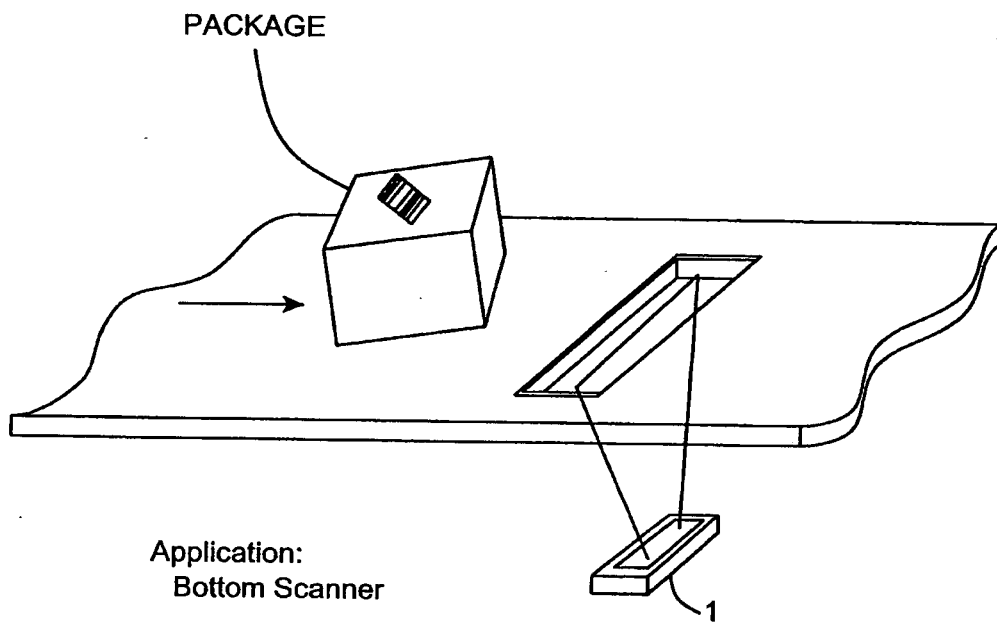
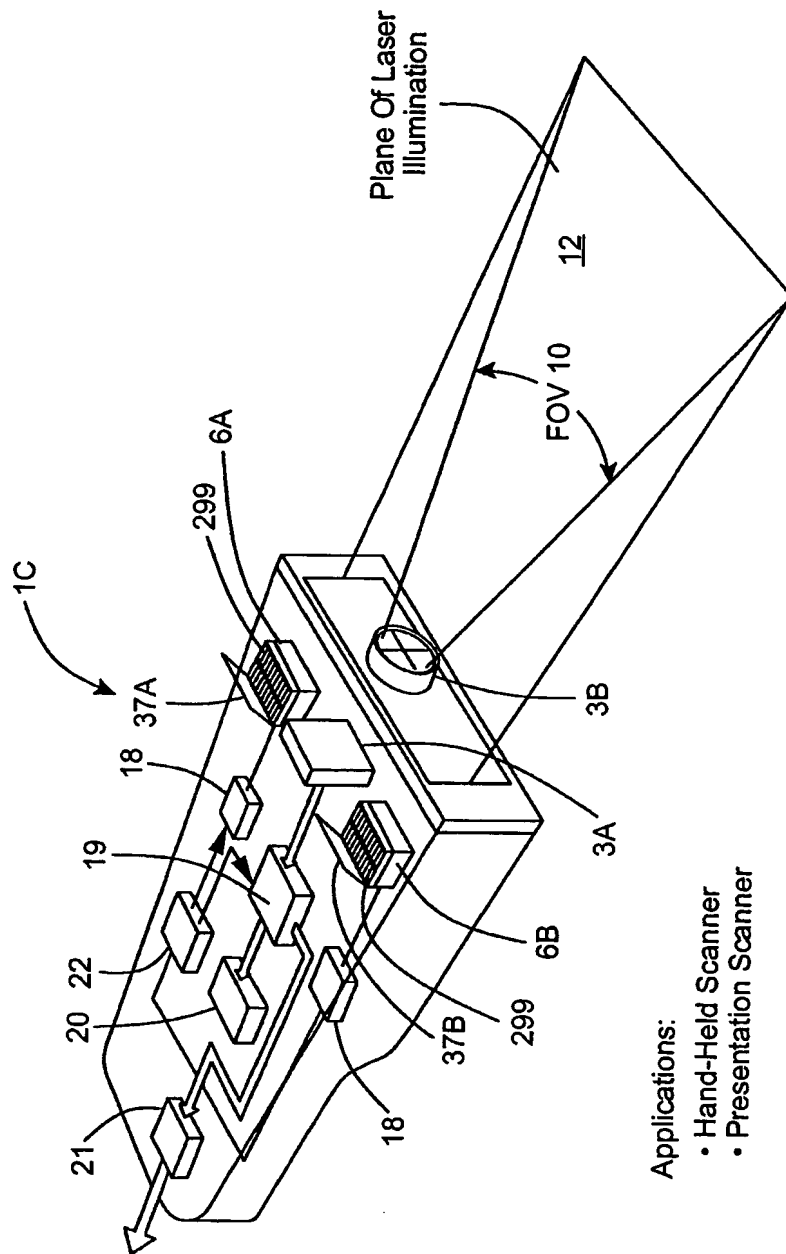


FIG. 1T



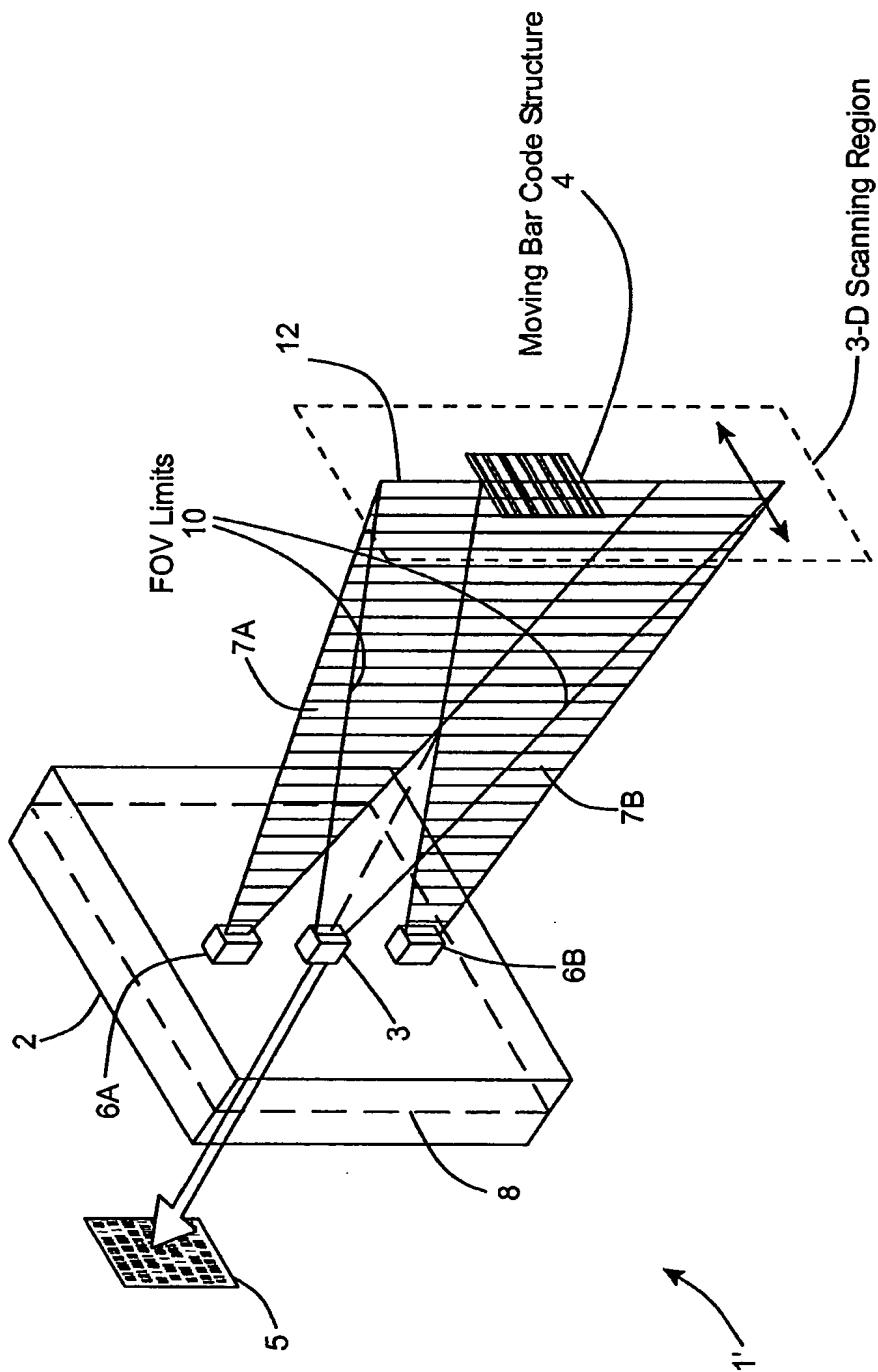


FIG. 1V1

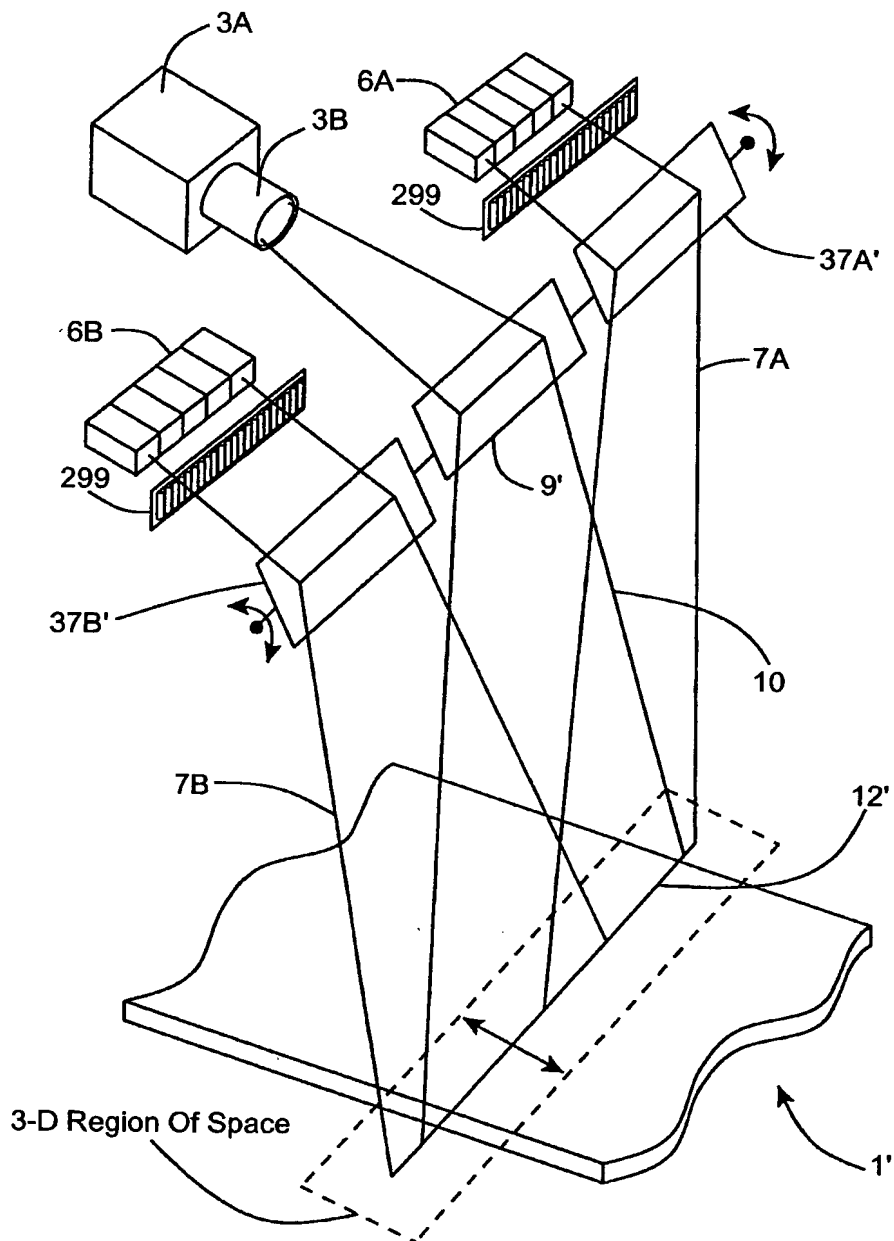


FIG. 1V2

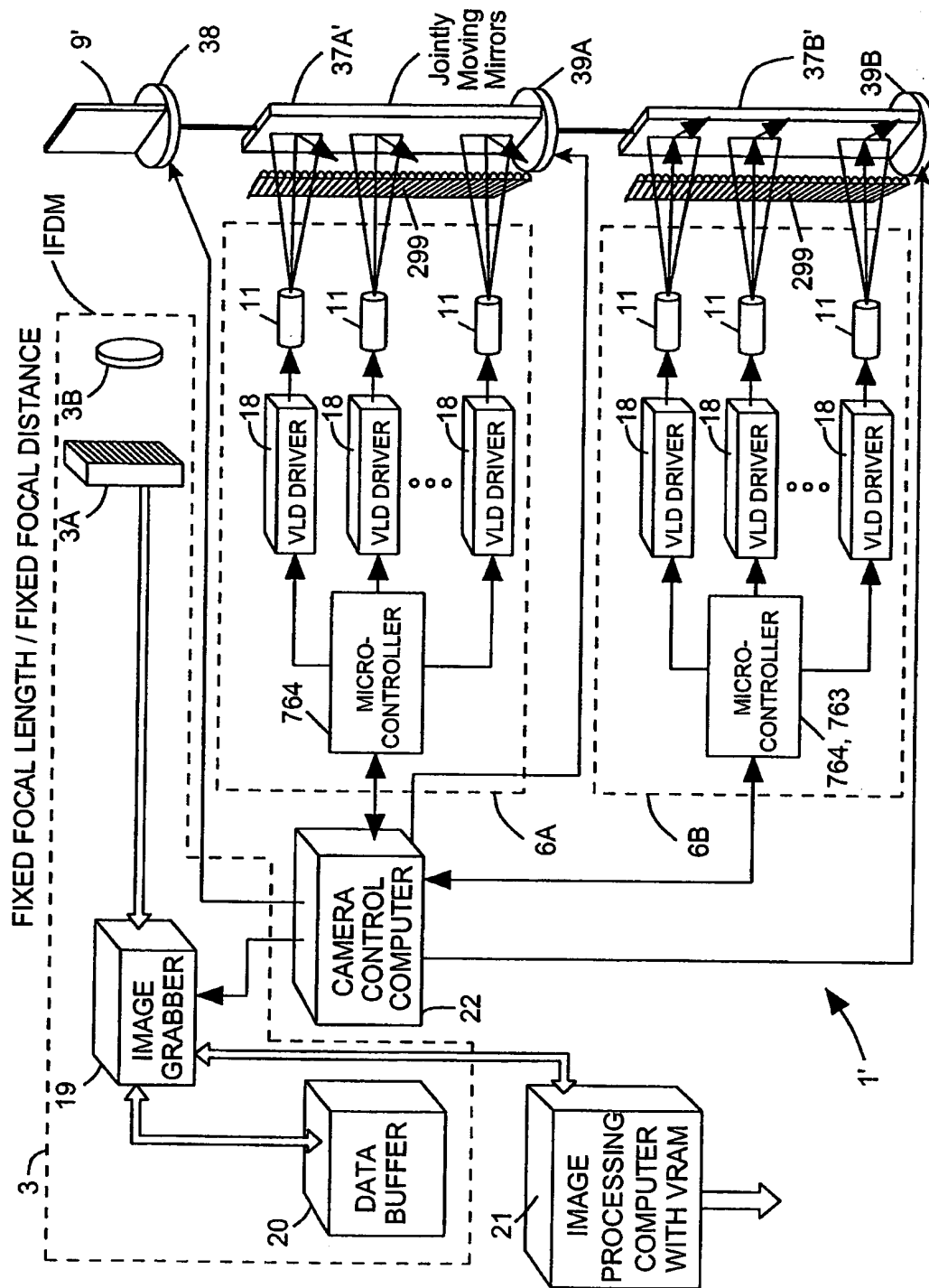


FIG. 1V3

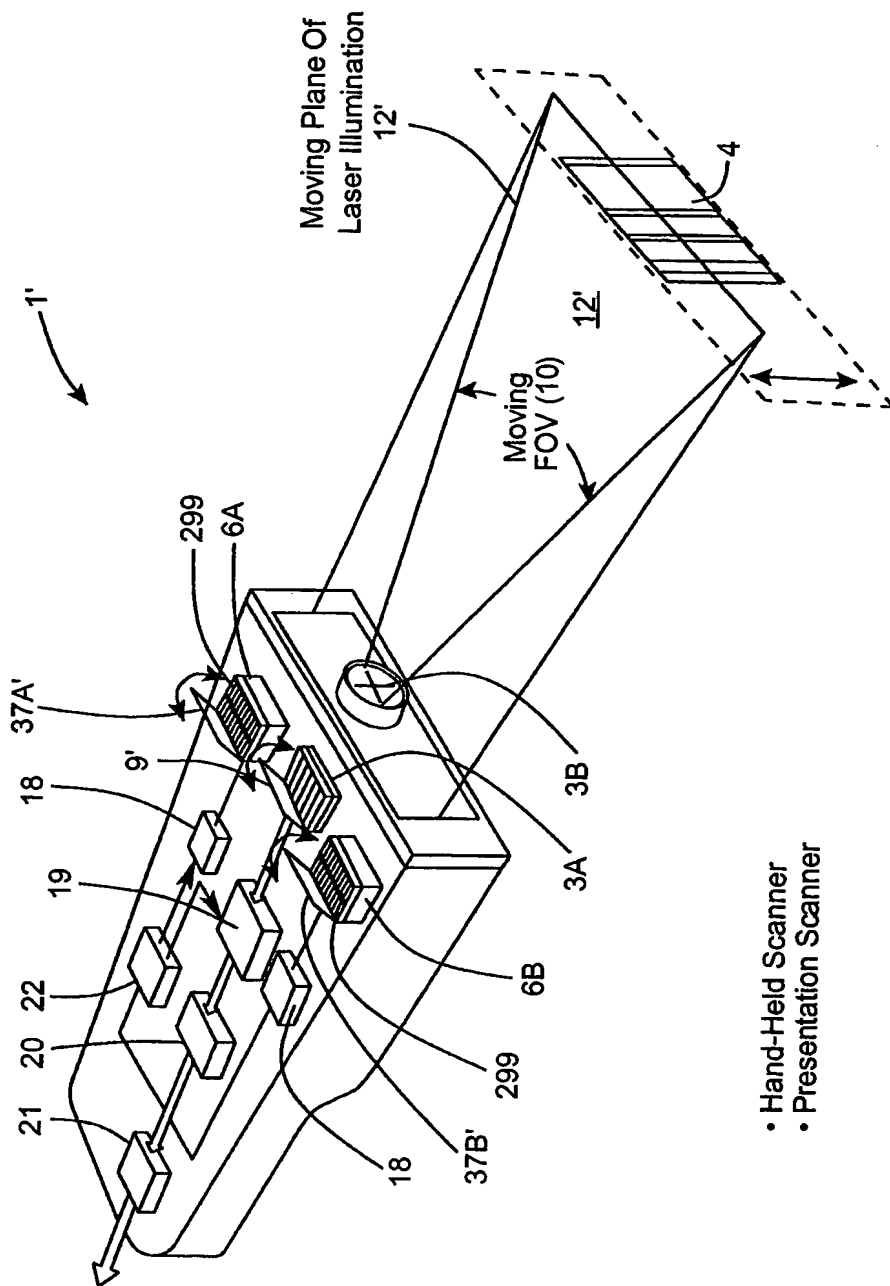


FIG. 1V4

- Hand-Held Scanner
- Presentation Scanner

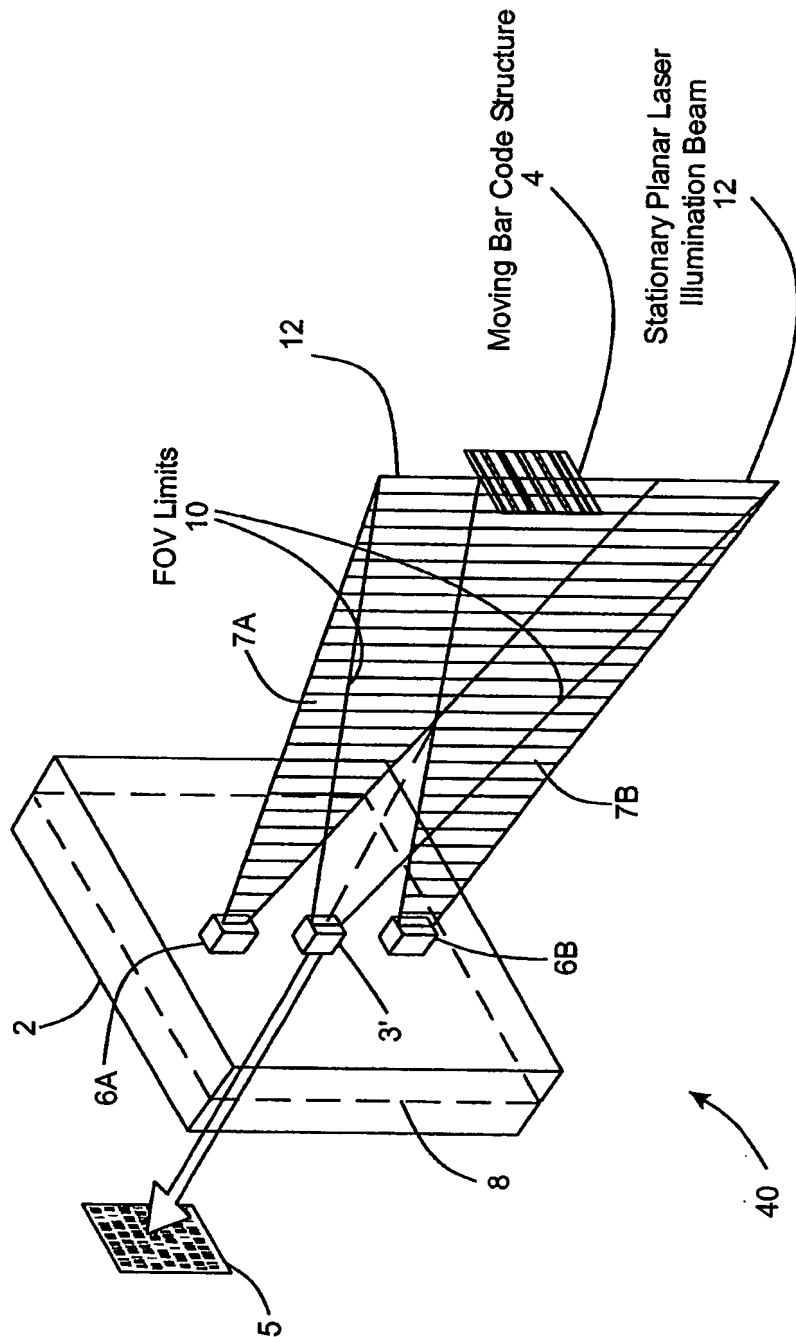
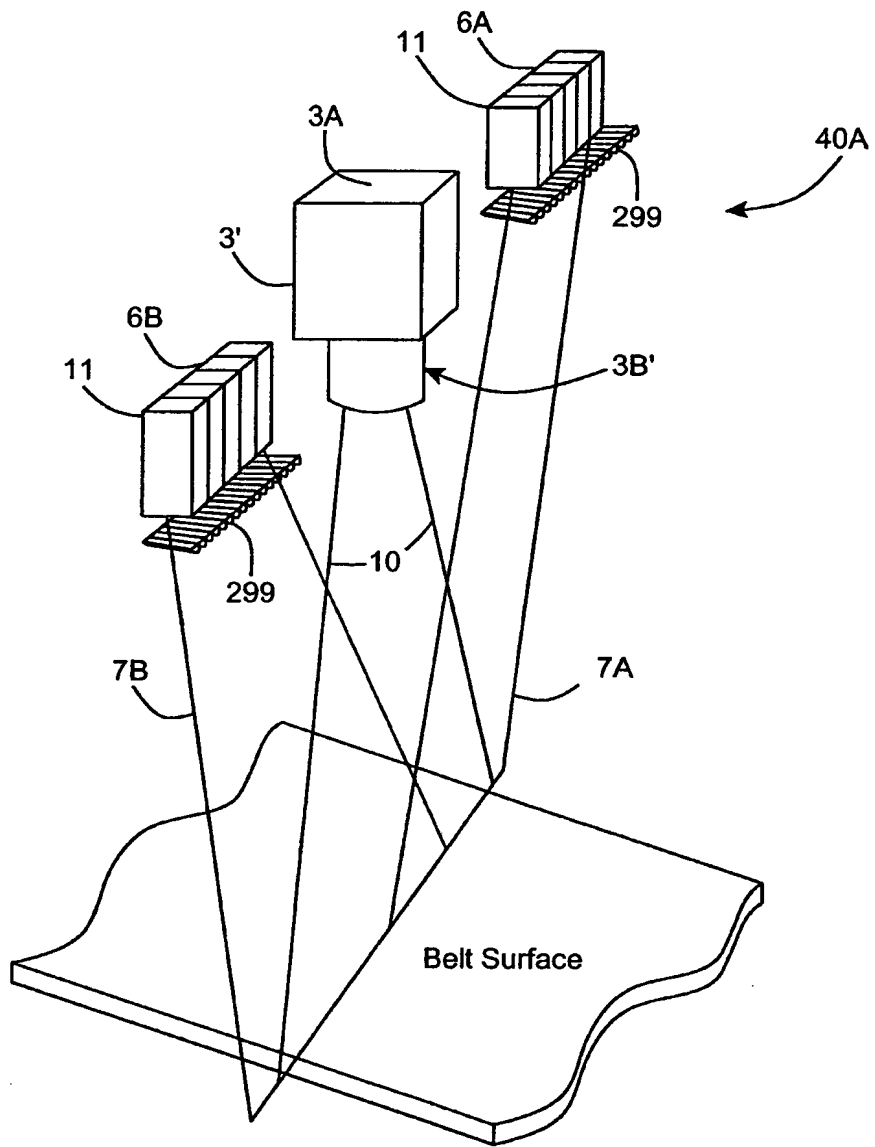
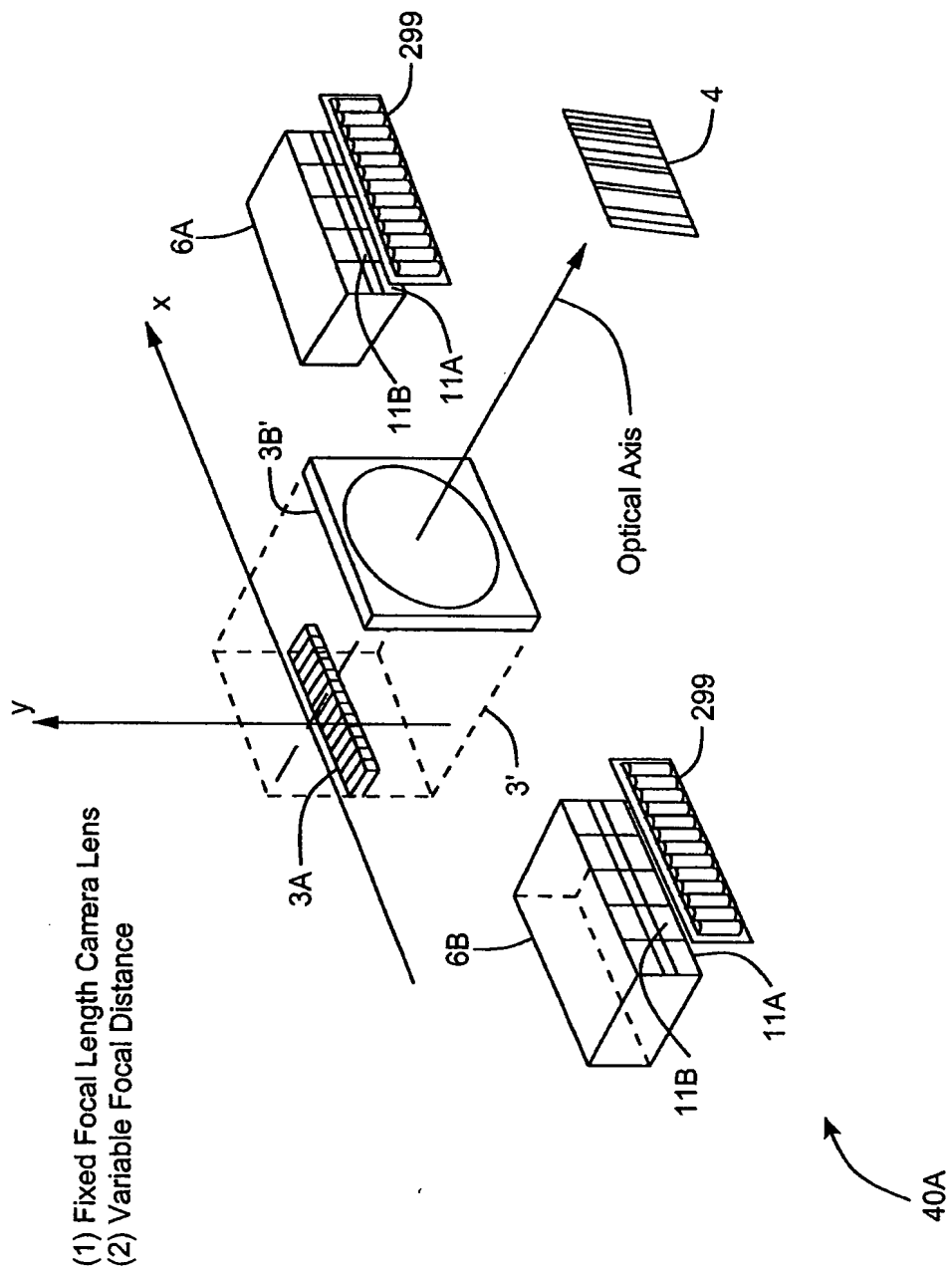


FIG. 2A





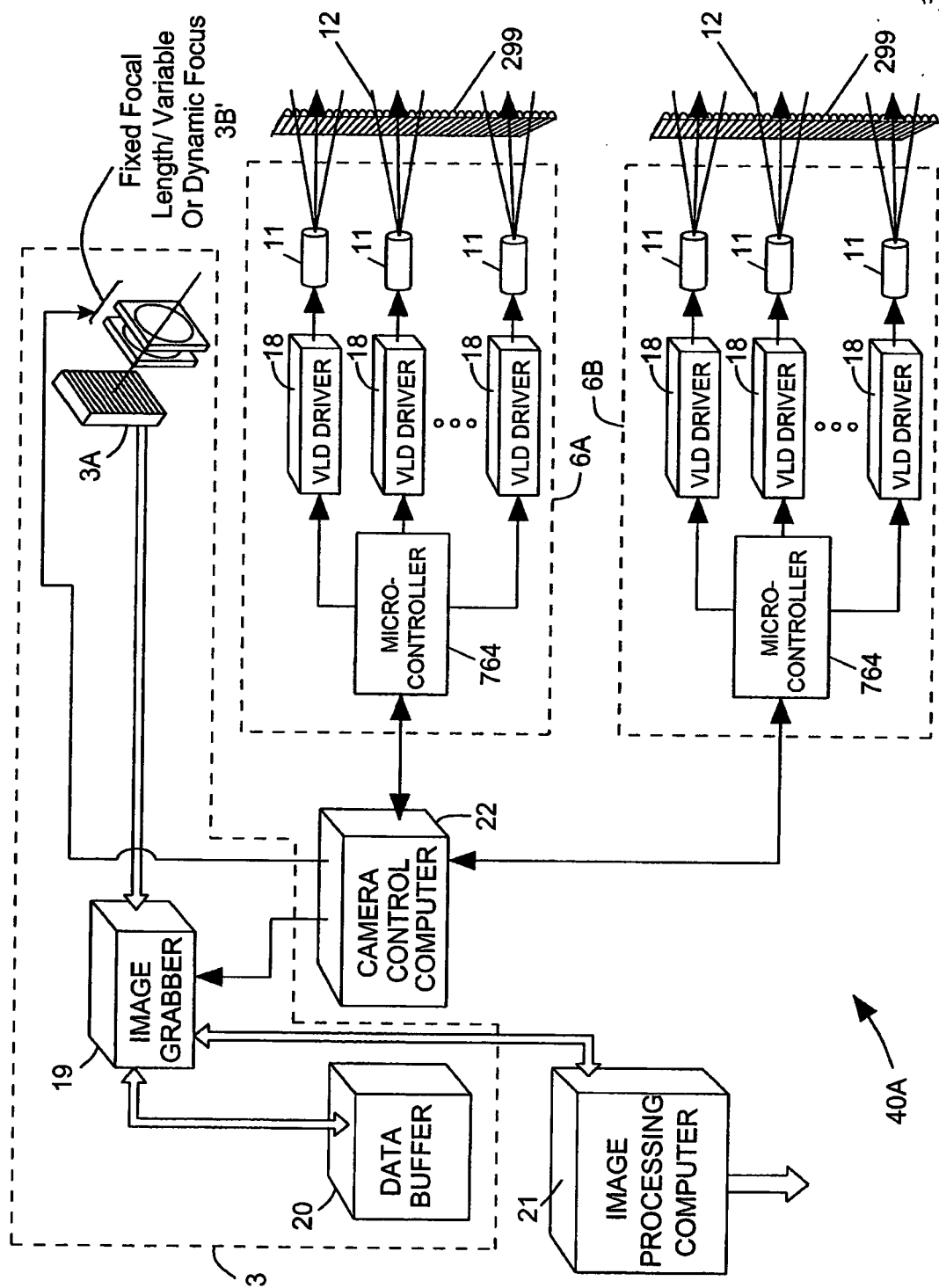


FIG. 2C1

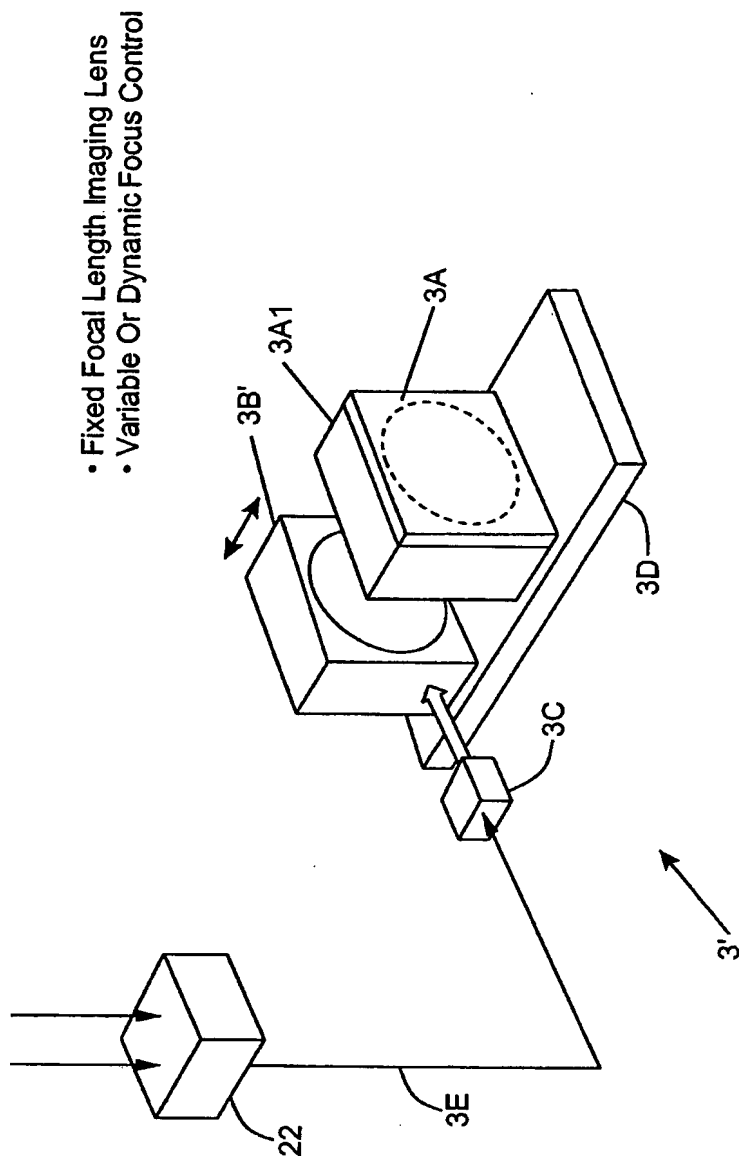


FIG. 2C2

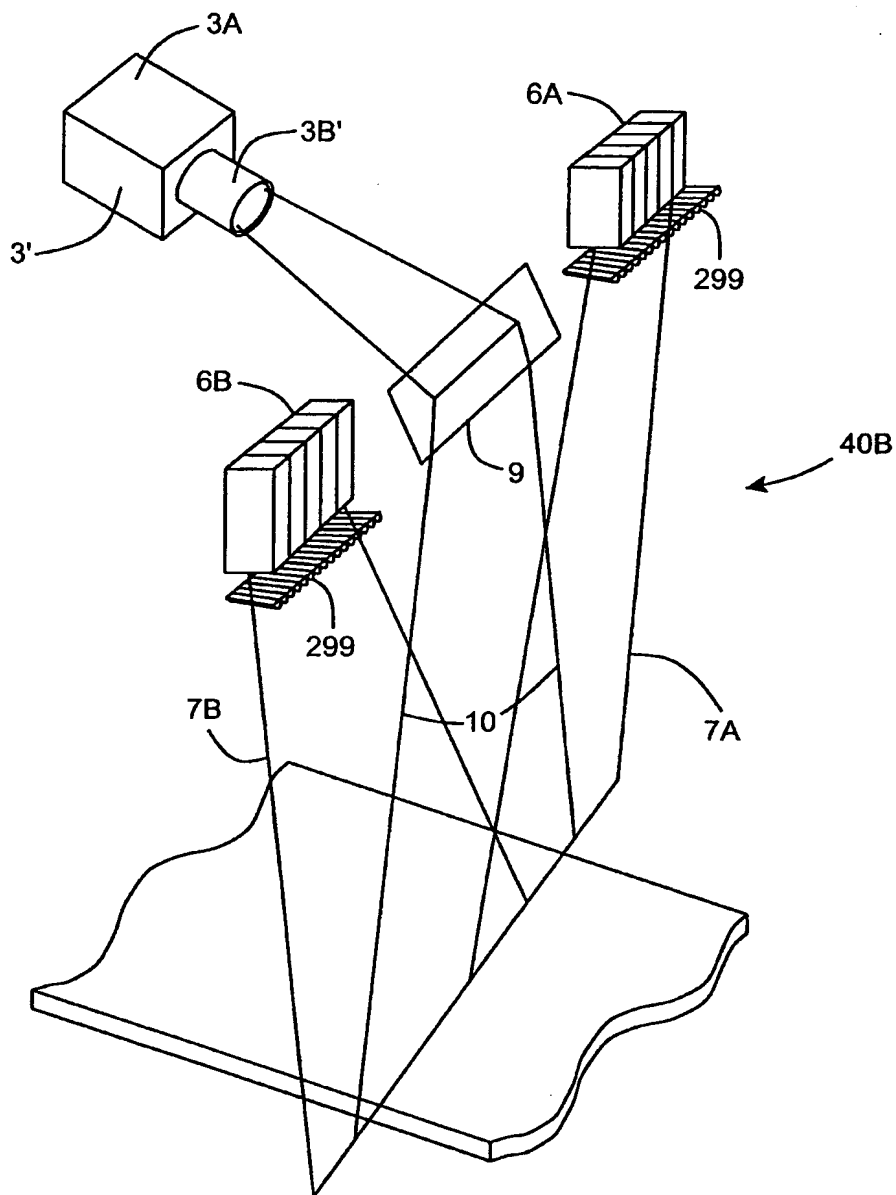


FIG. 2D1

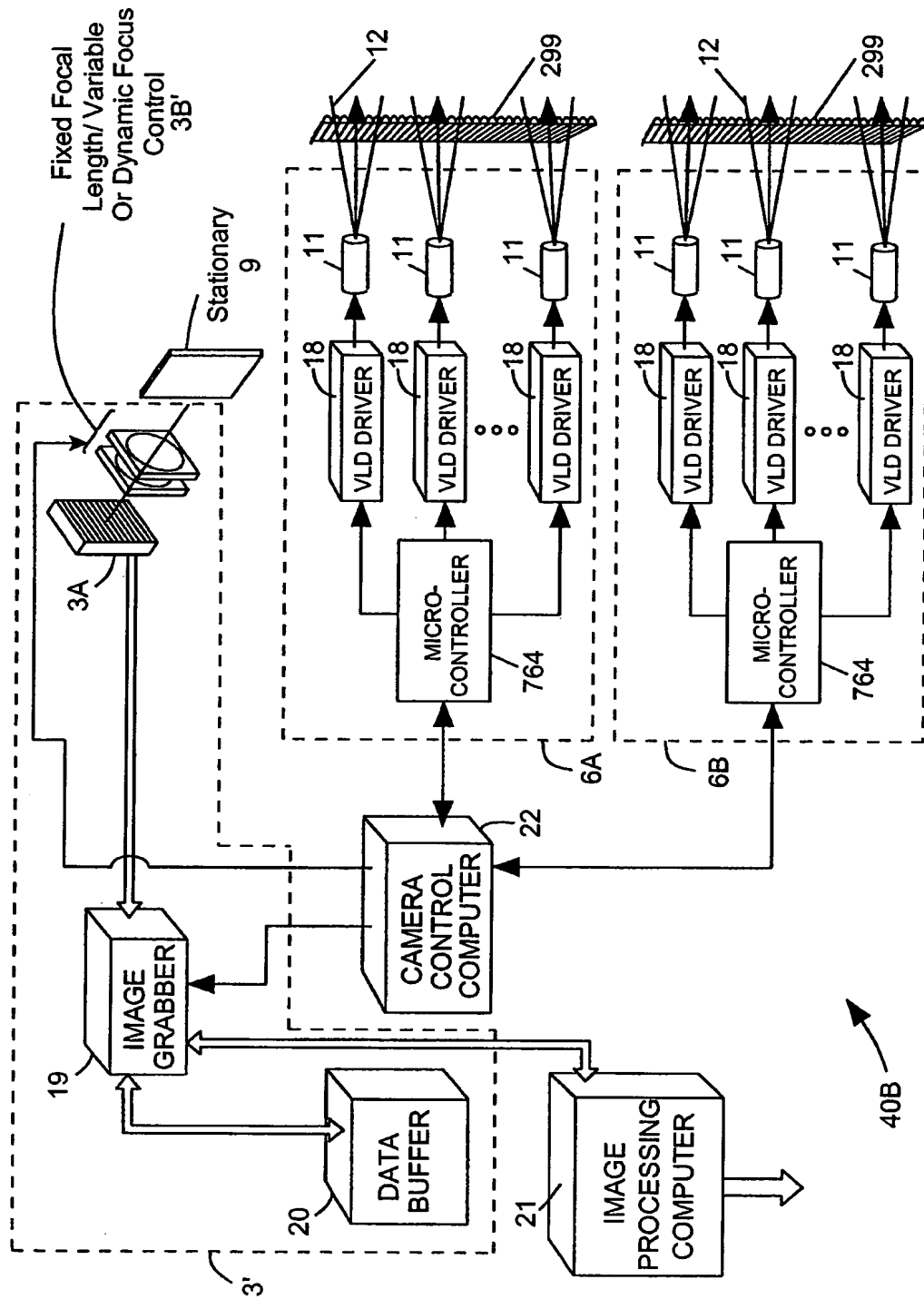


FIG. 2D2

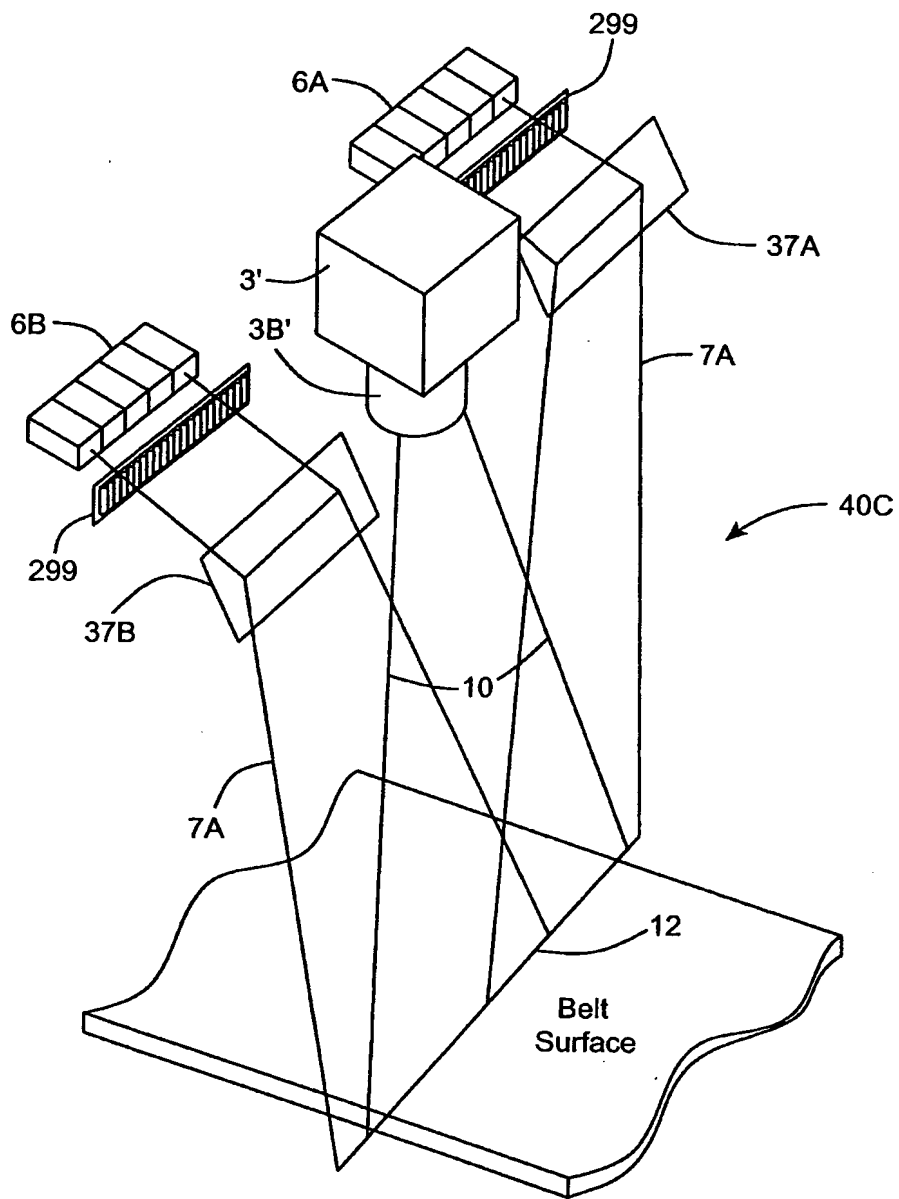


FIG. 2E1

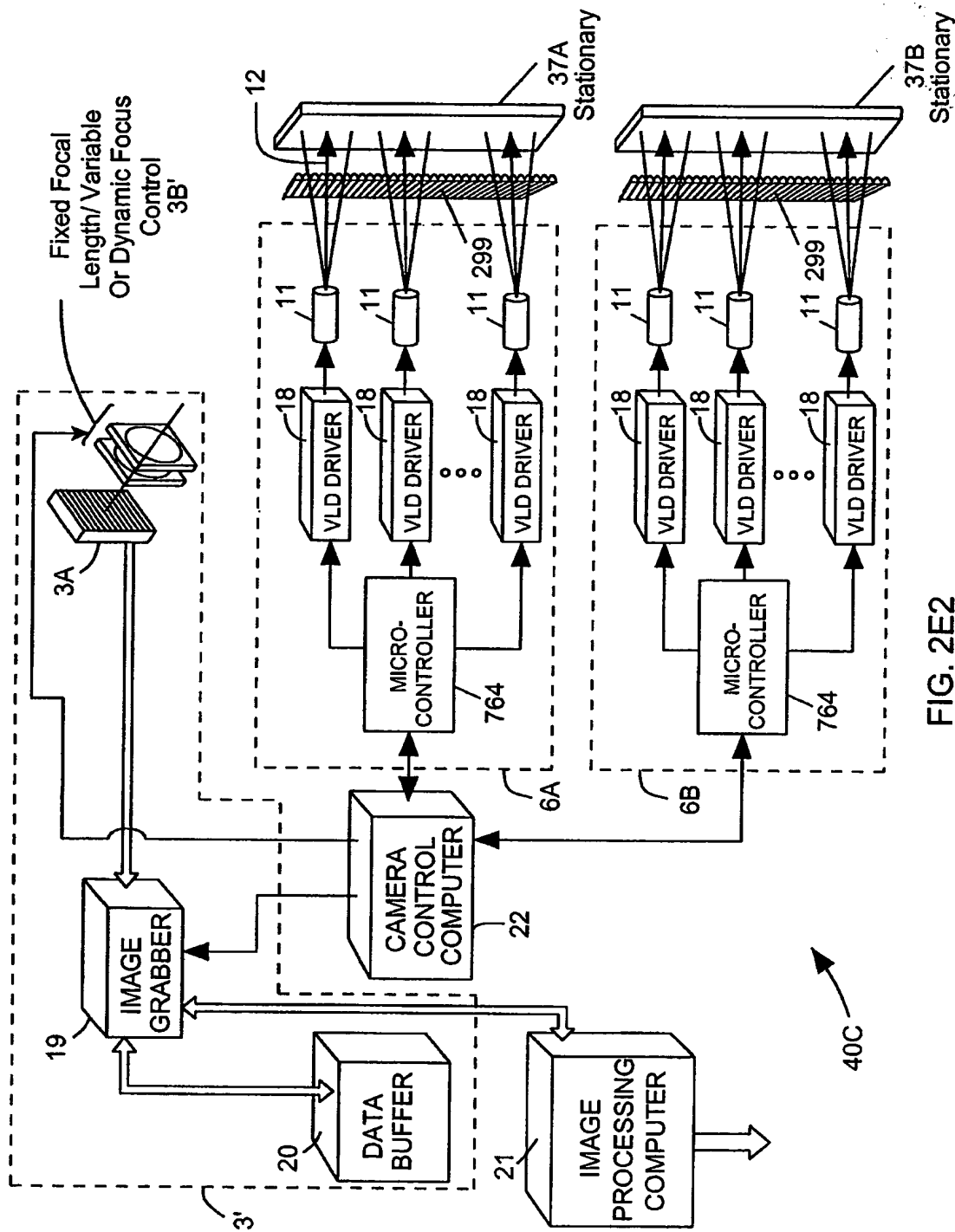


FIG. 2E2

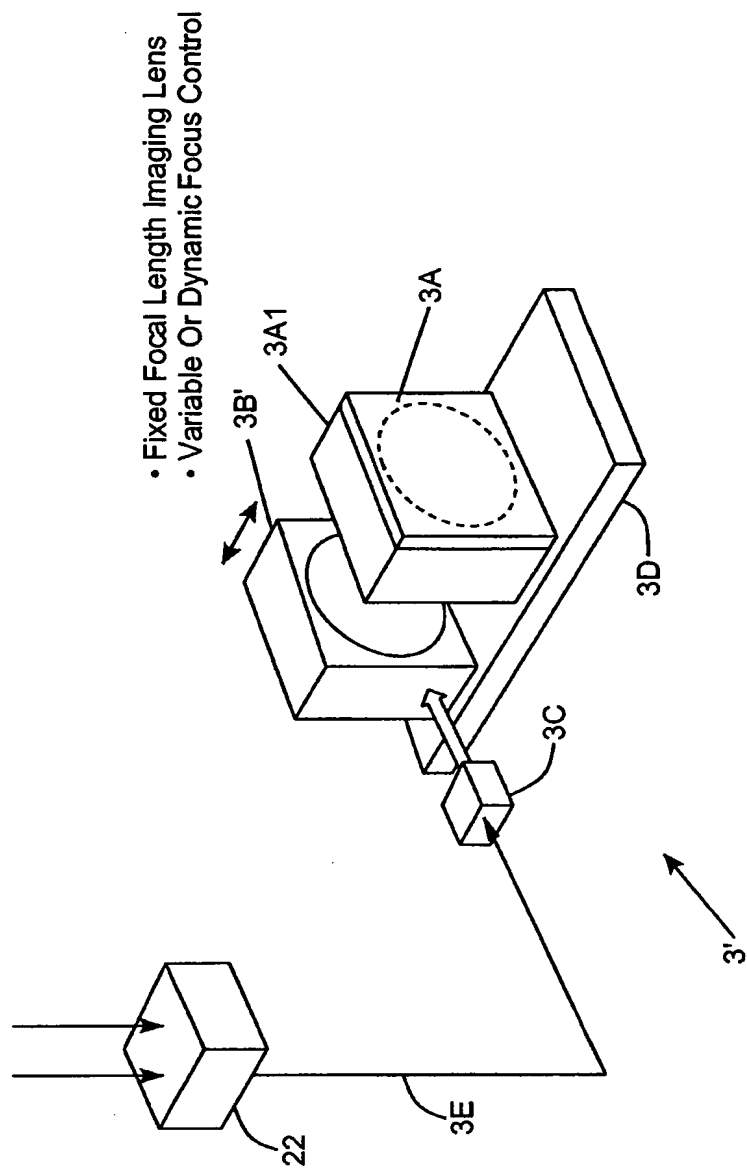


FIG. 2E3

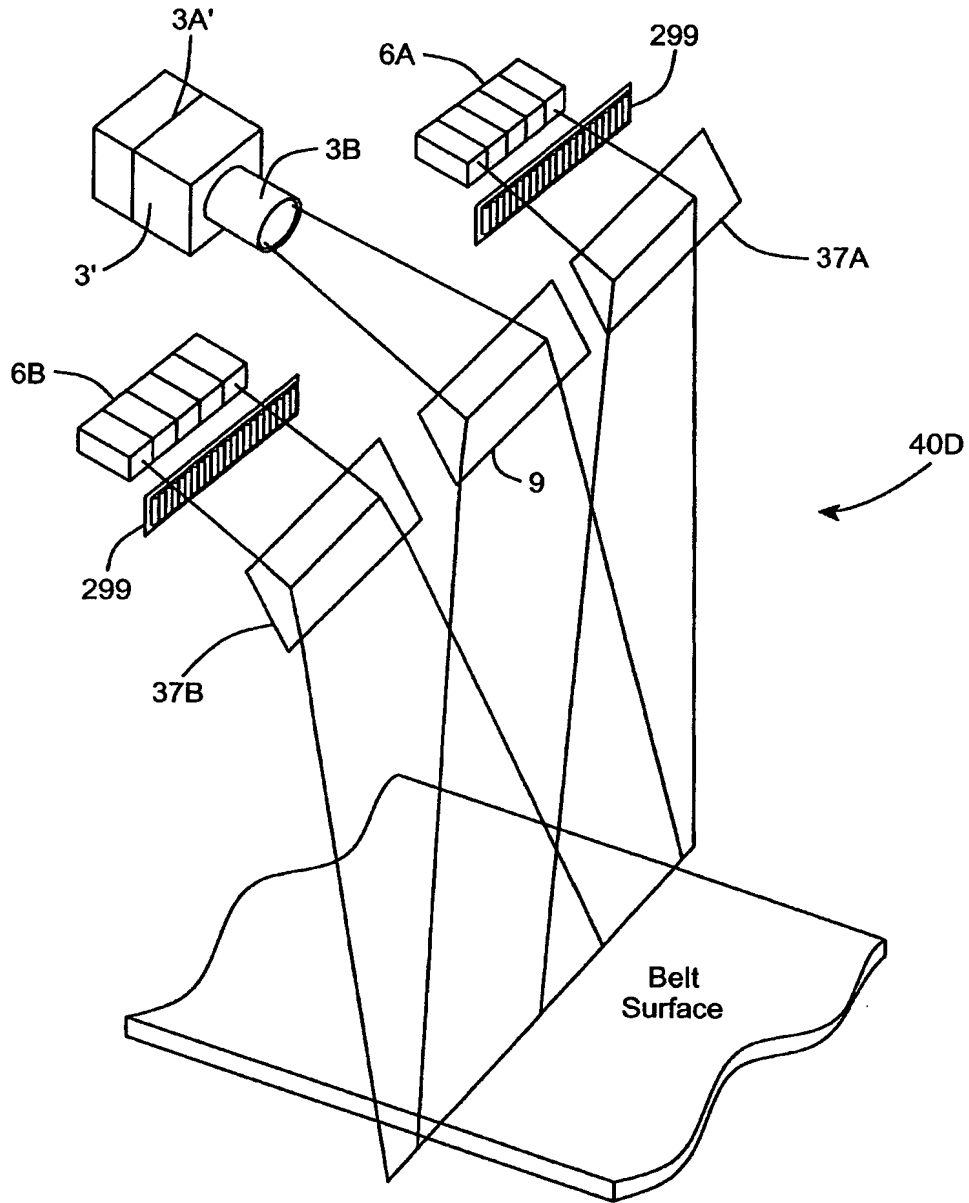


FIG. 2F1

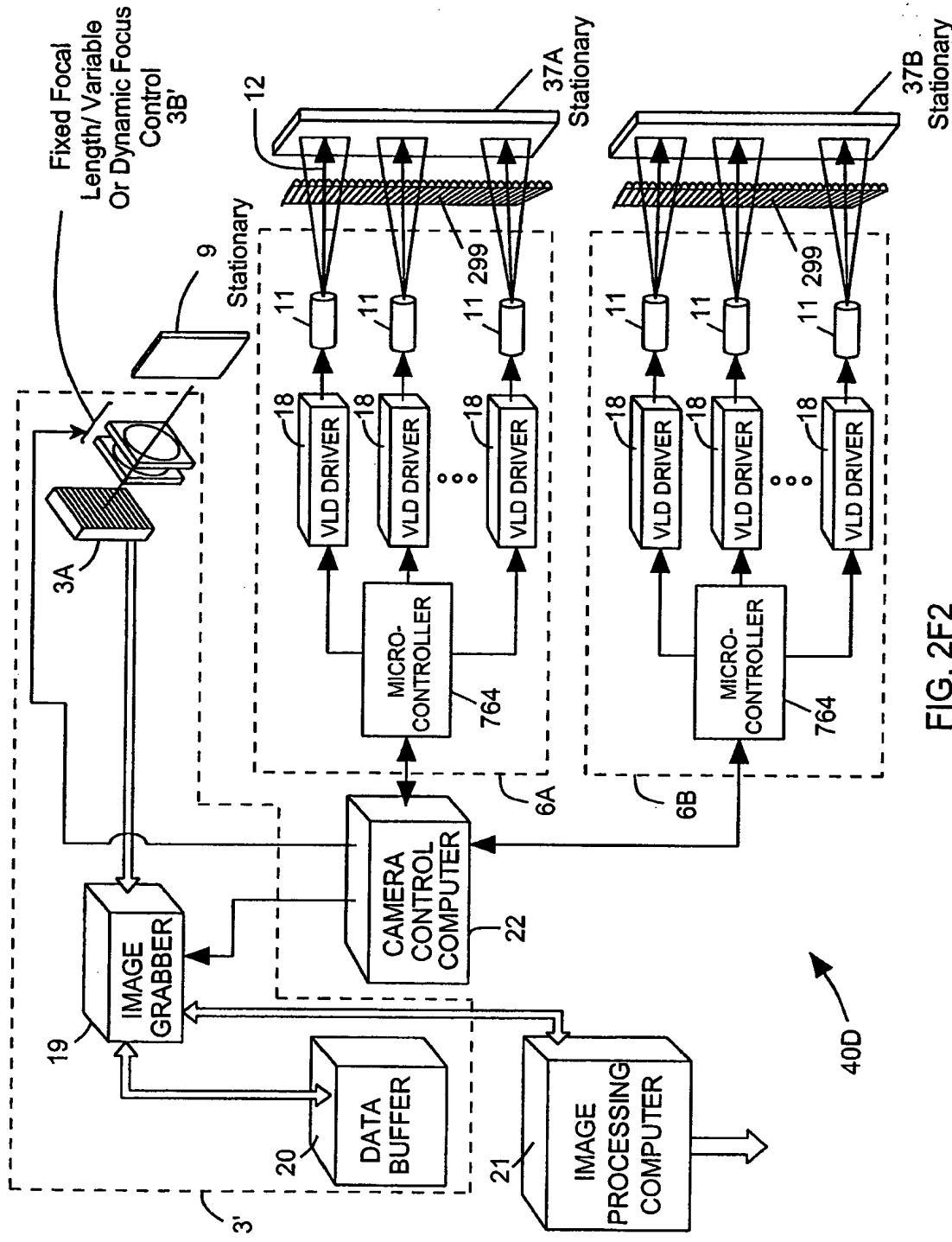


FIG. 2F2

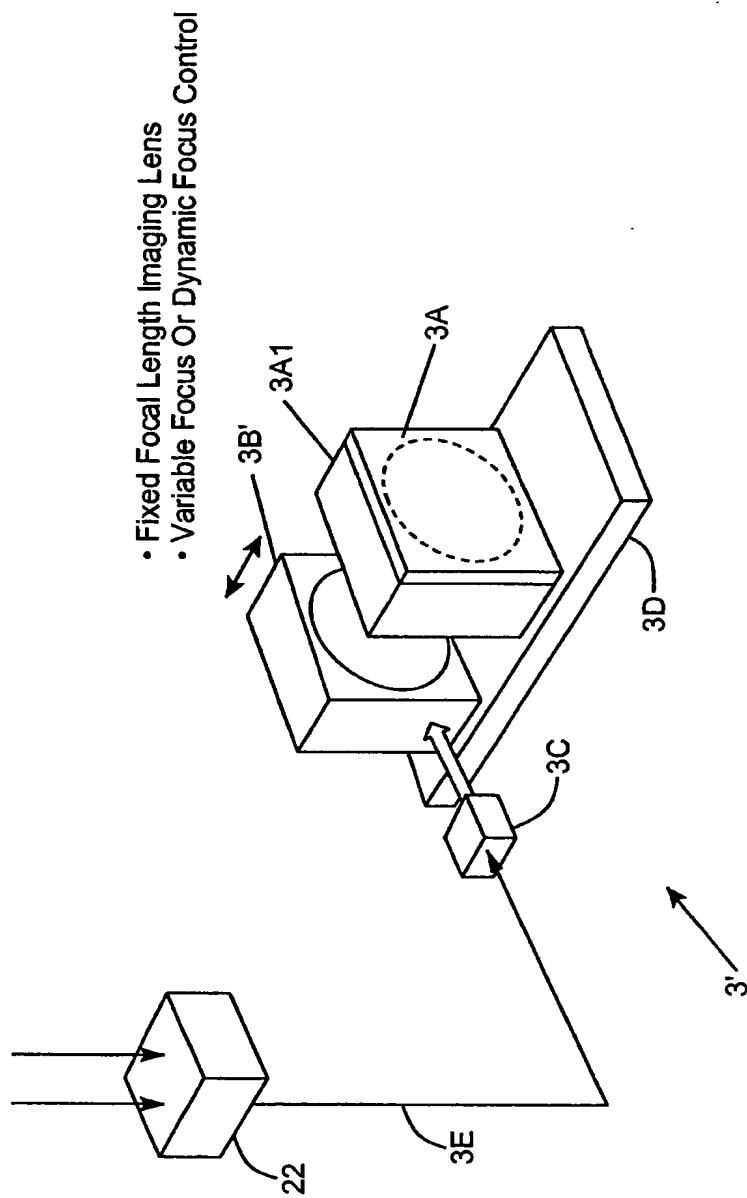


FIG. 2F3

Top Conveyor Scanner:

- Fixed Focal Length Imaging Lens
- Variable Focal Distance Control

Side Conveyor Scanner:

- Fixed Focal Length Imaging Lens
- Dynamic Focal Distance Control

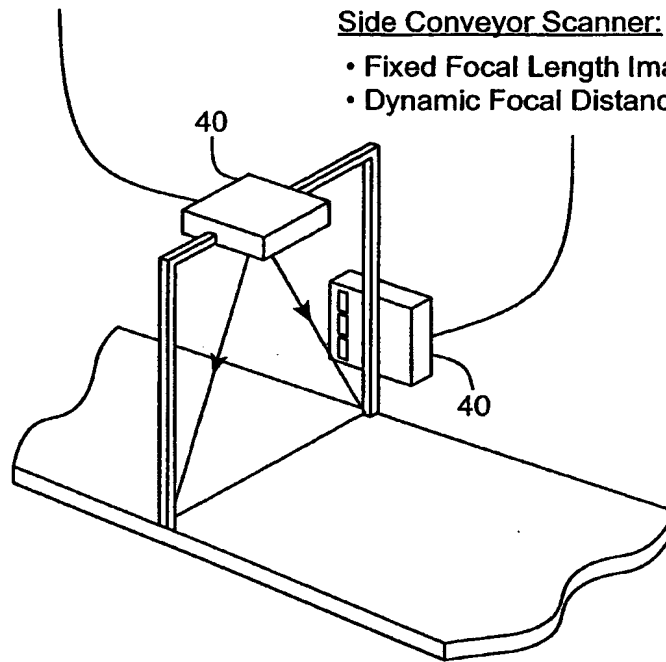


FIG. 2G

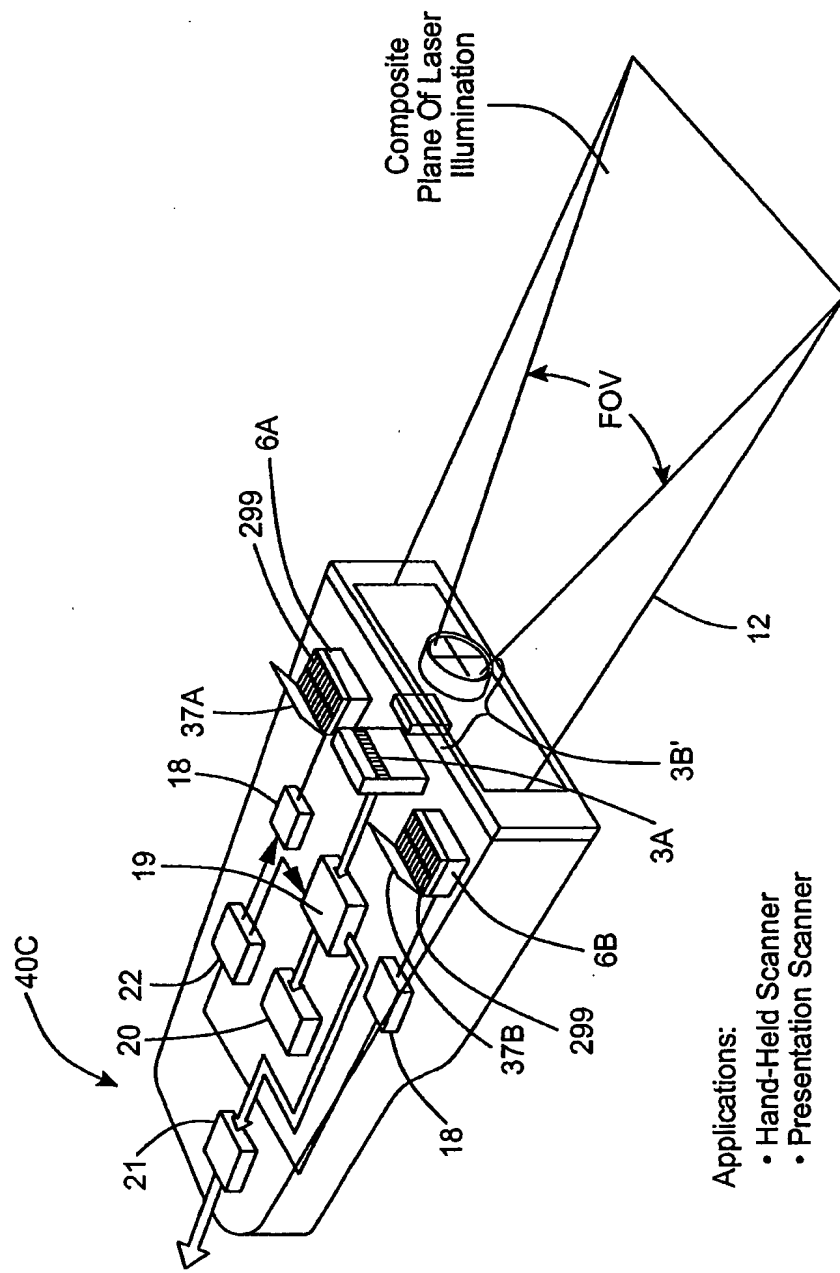


FIG. 2H

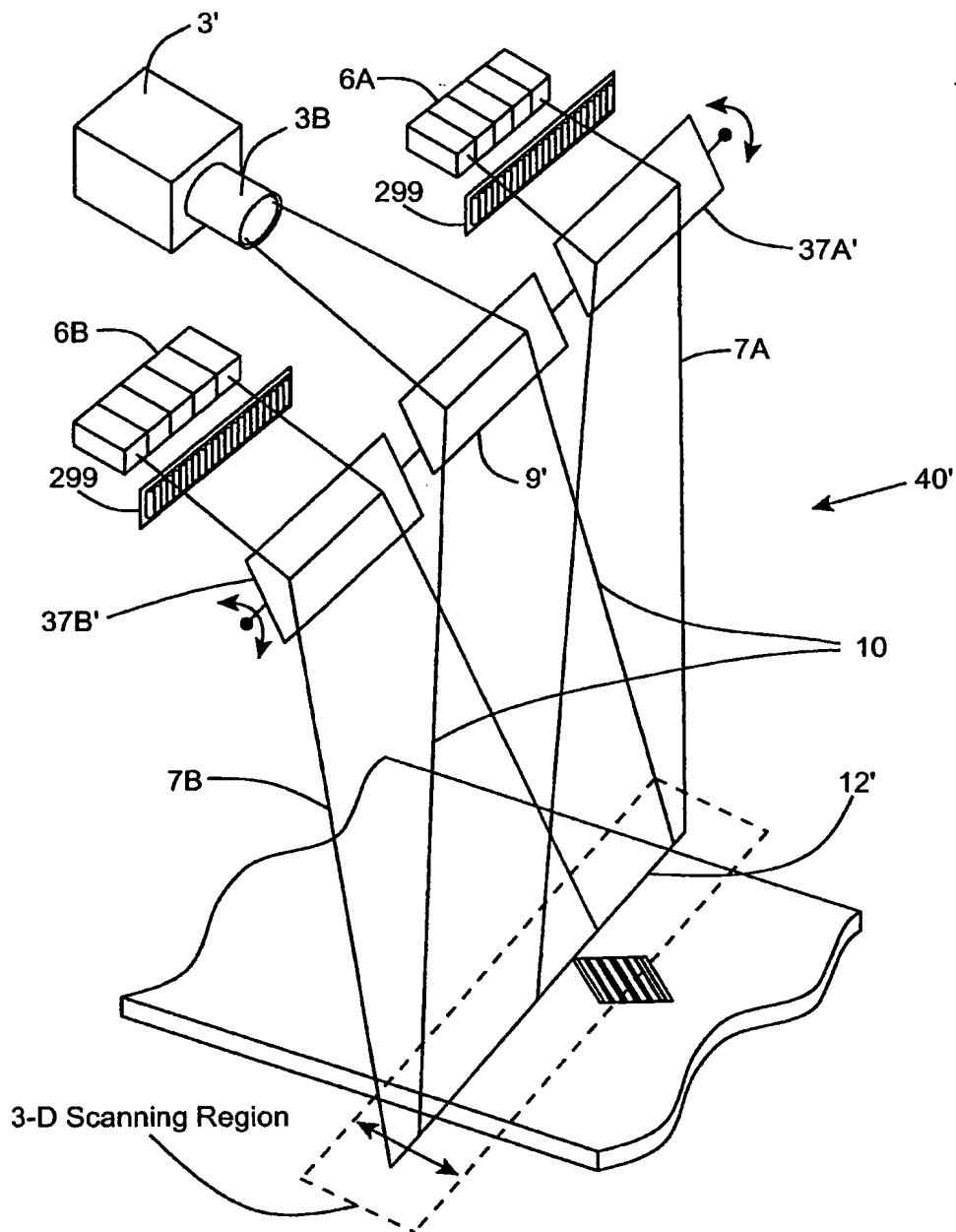


FIG. 212

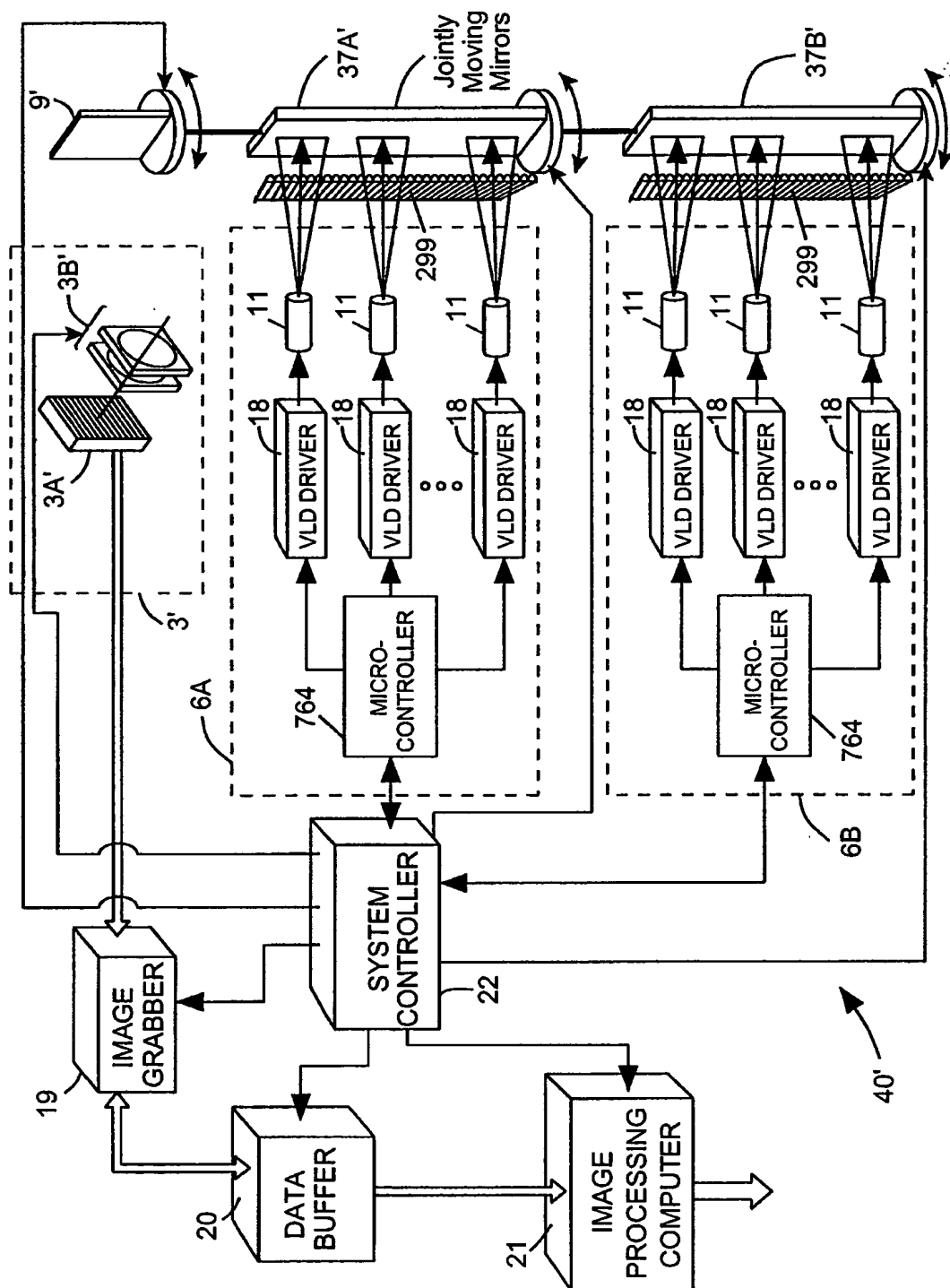


FIG. 213

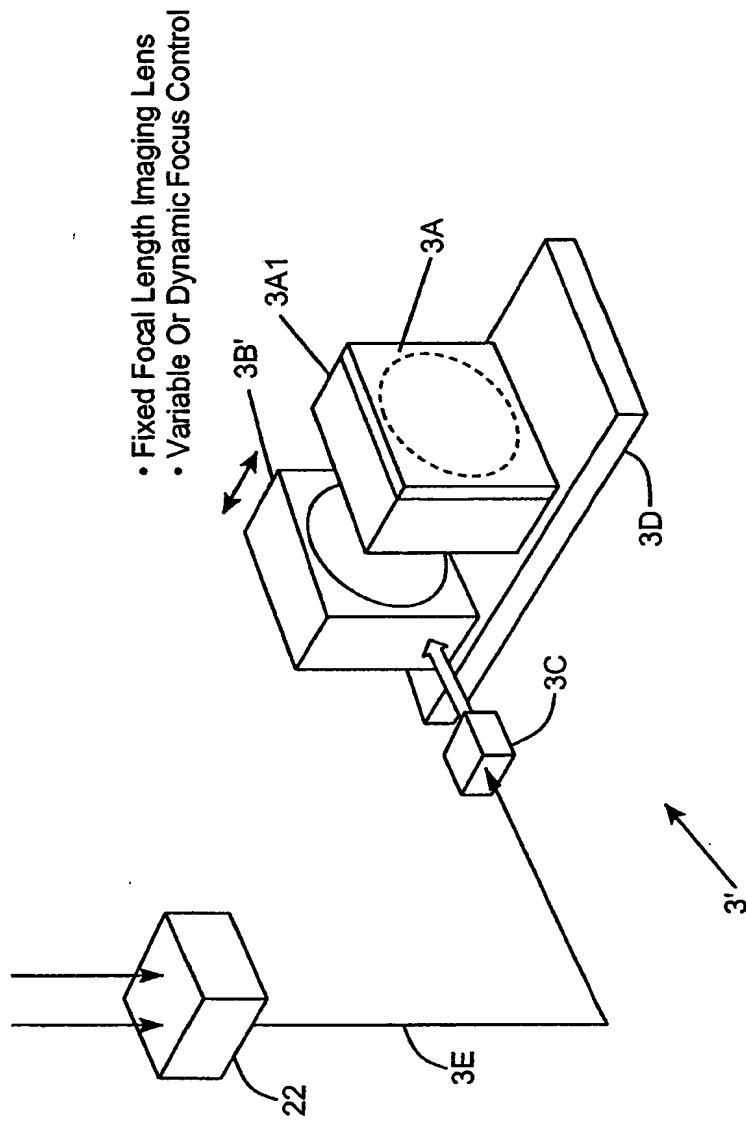


FIG. 214

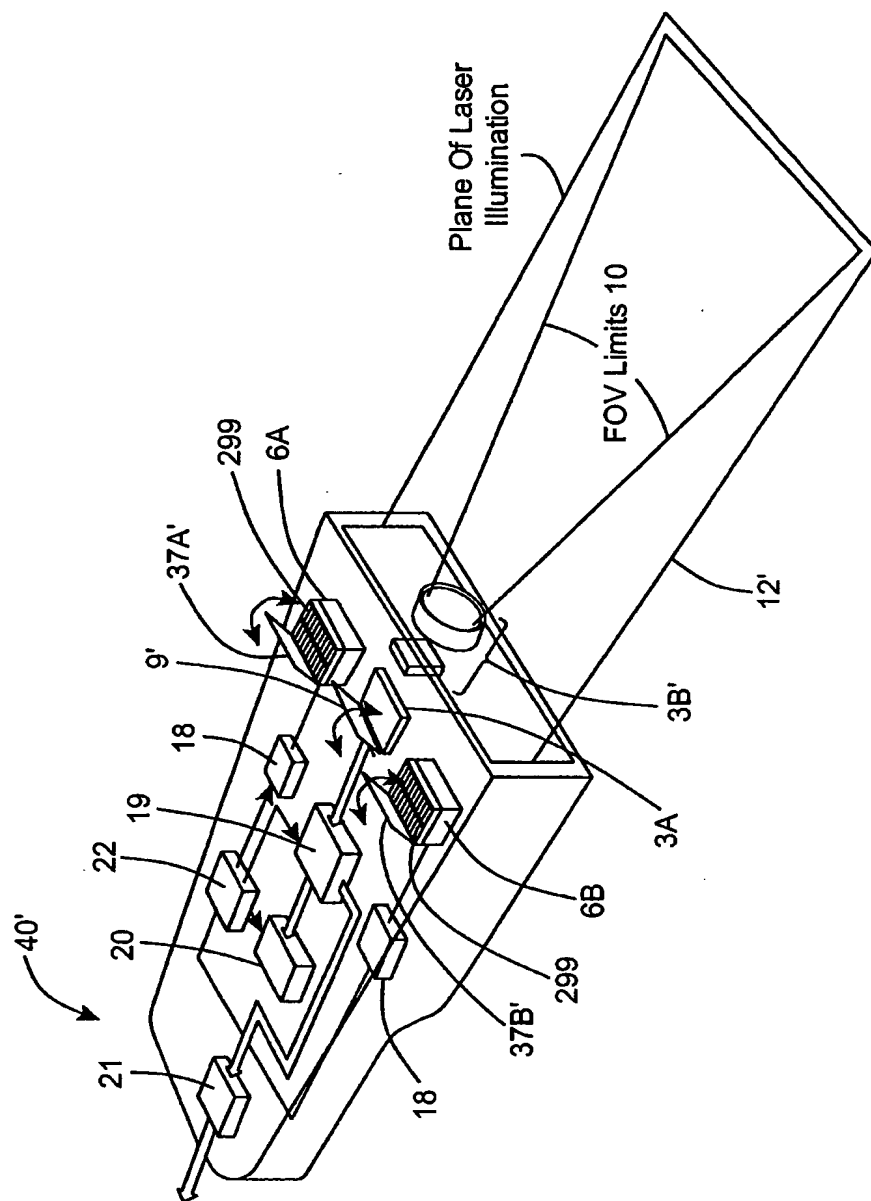


FIG. 215

20000104523004

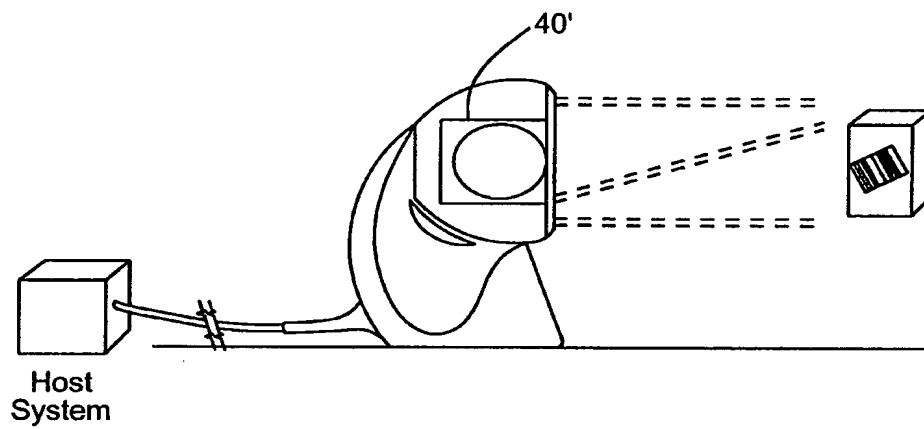


FIG. 216

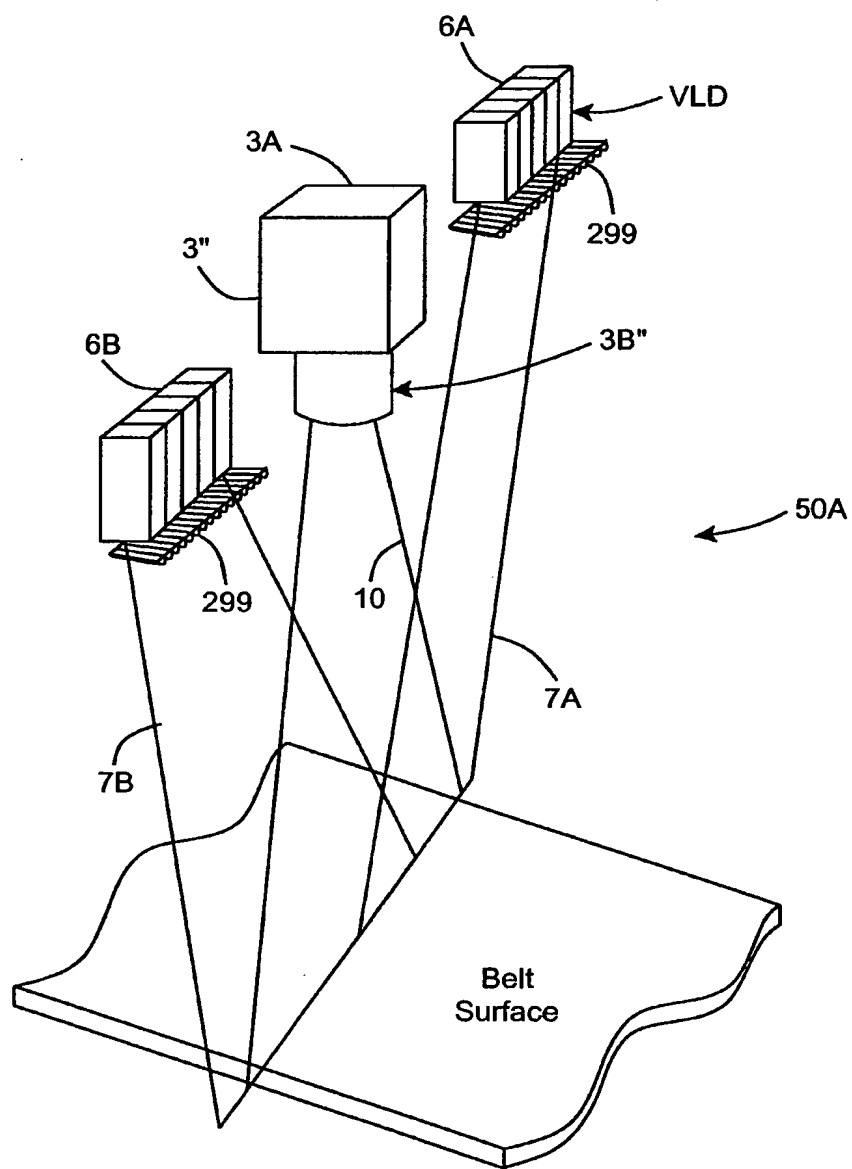


FIG. 3B1

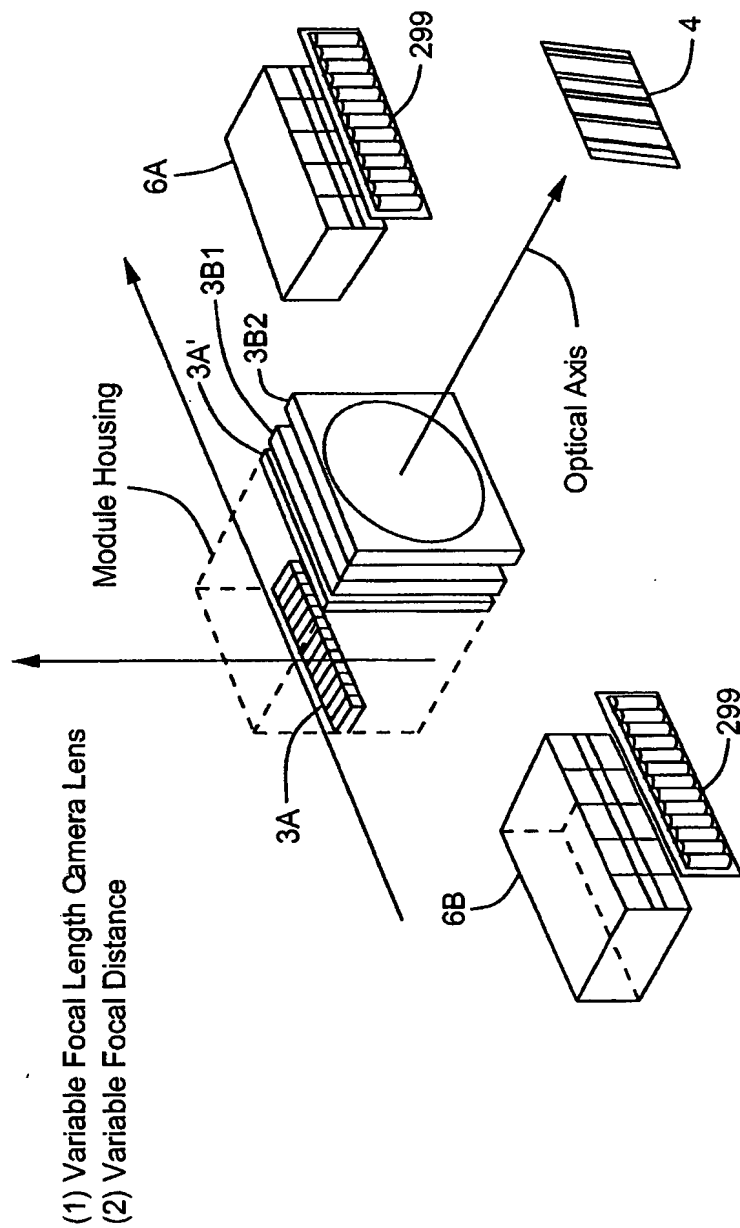


FIG. 3B2

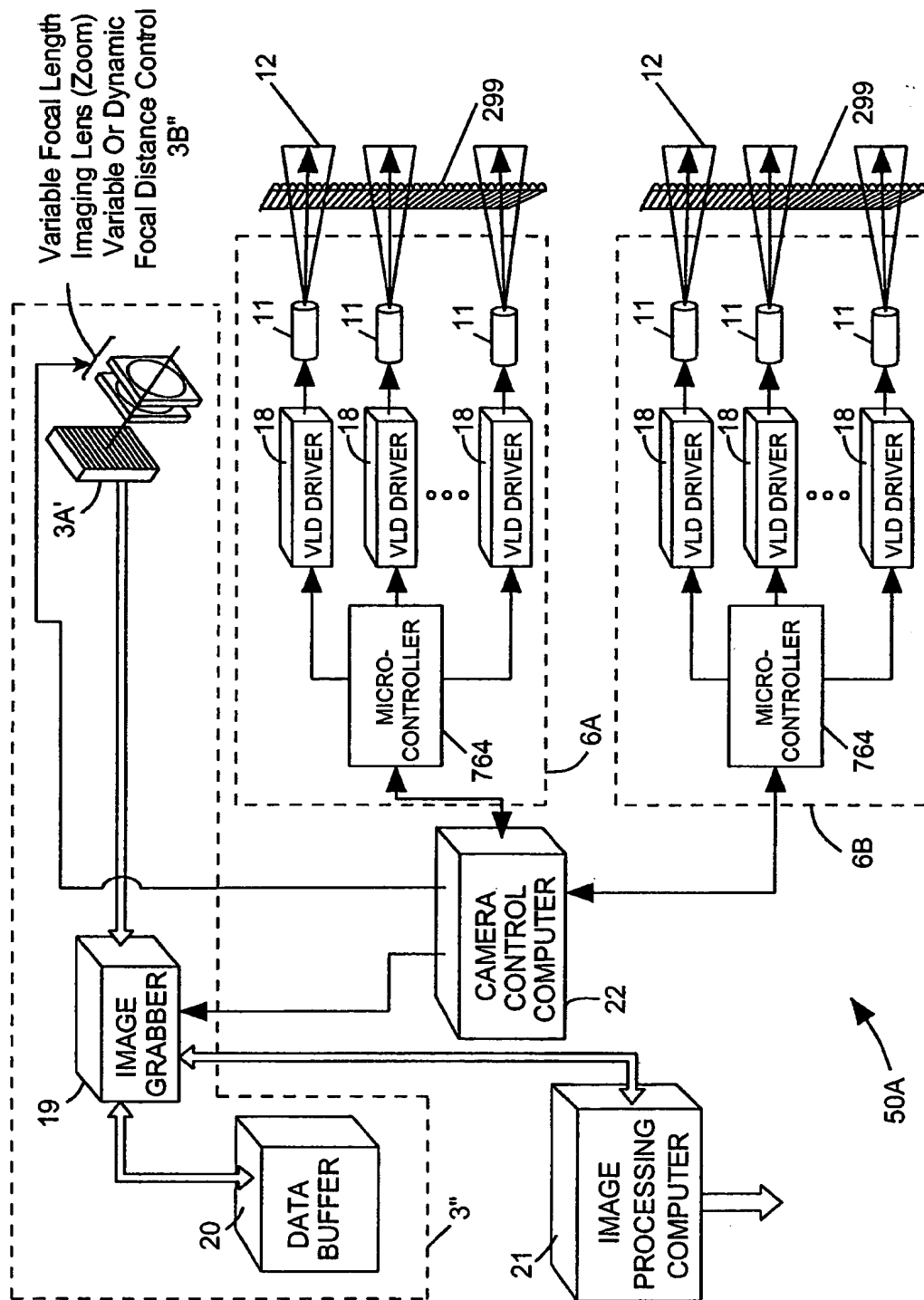
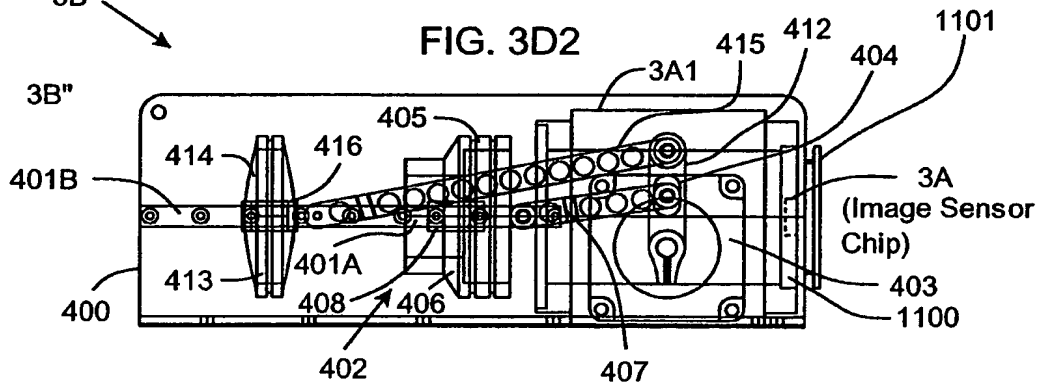
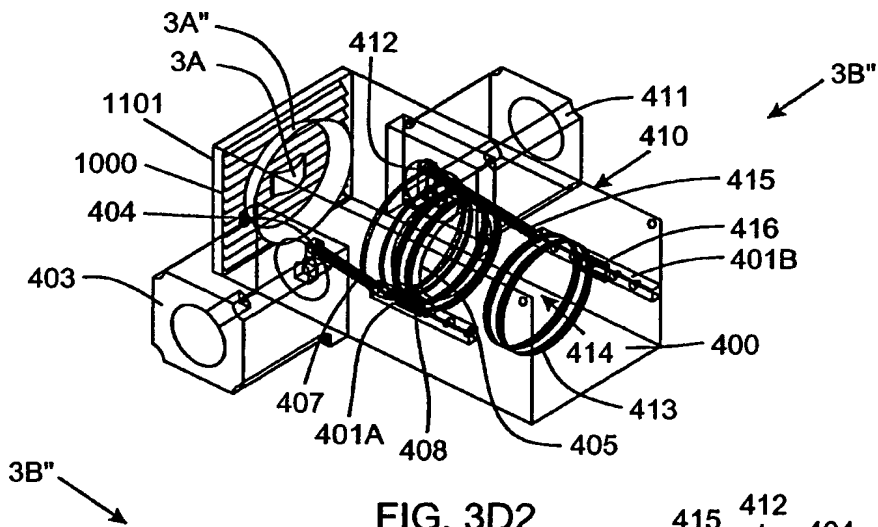
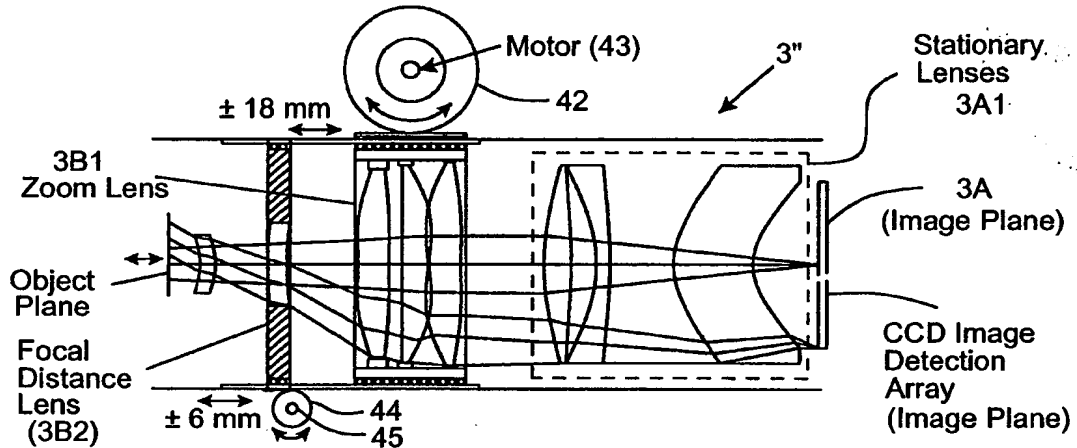


FIG. 3C1



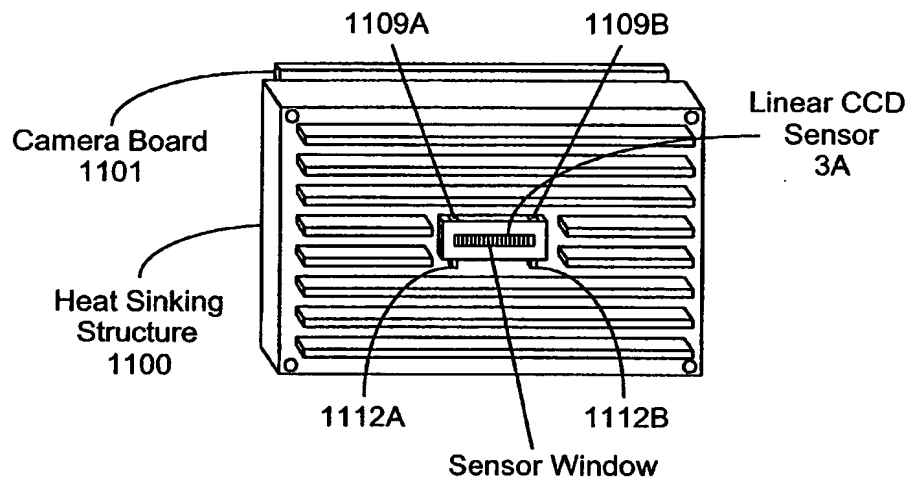


FIG. 3D4

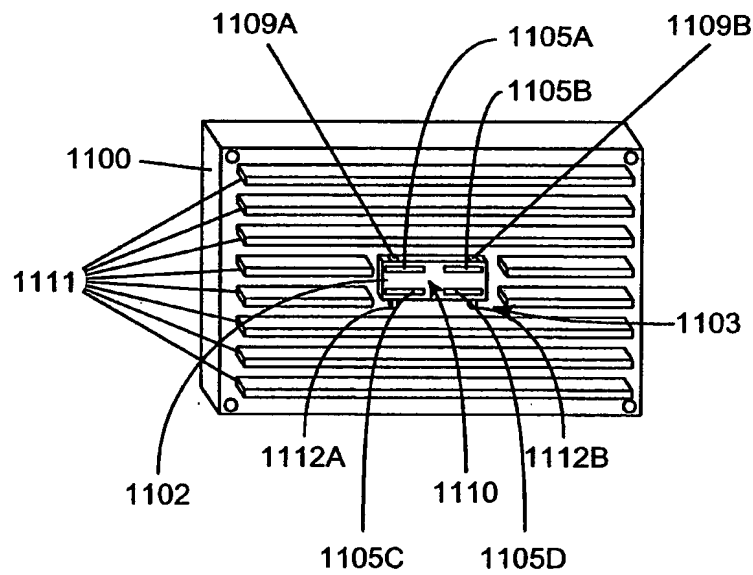


FIG. 3D5

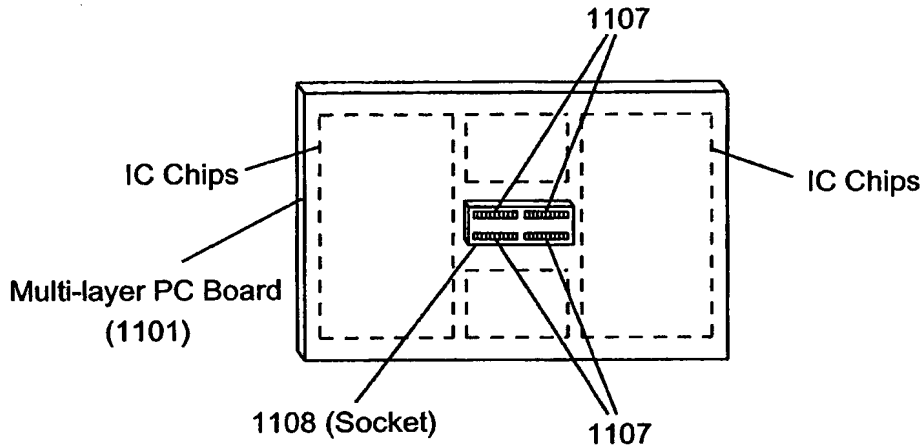


FIG. 3D6

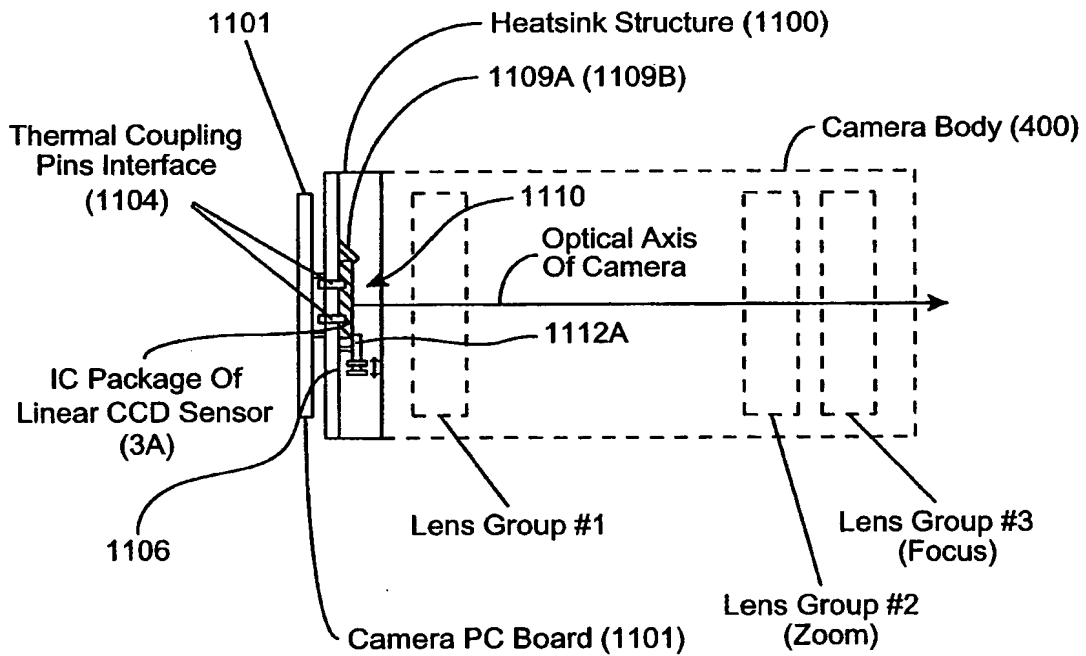


FIG. 3D7

20060207 04523001

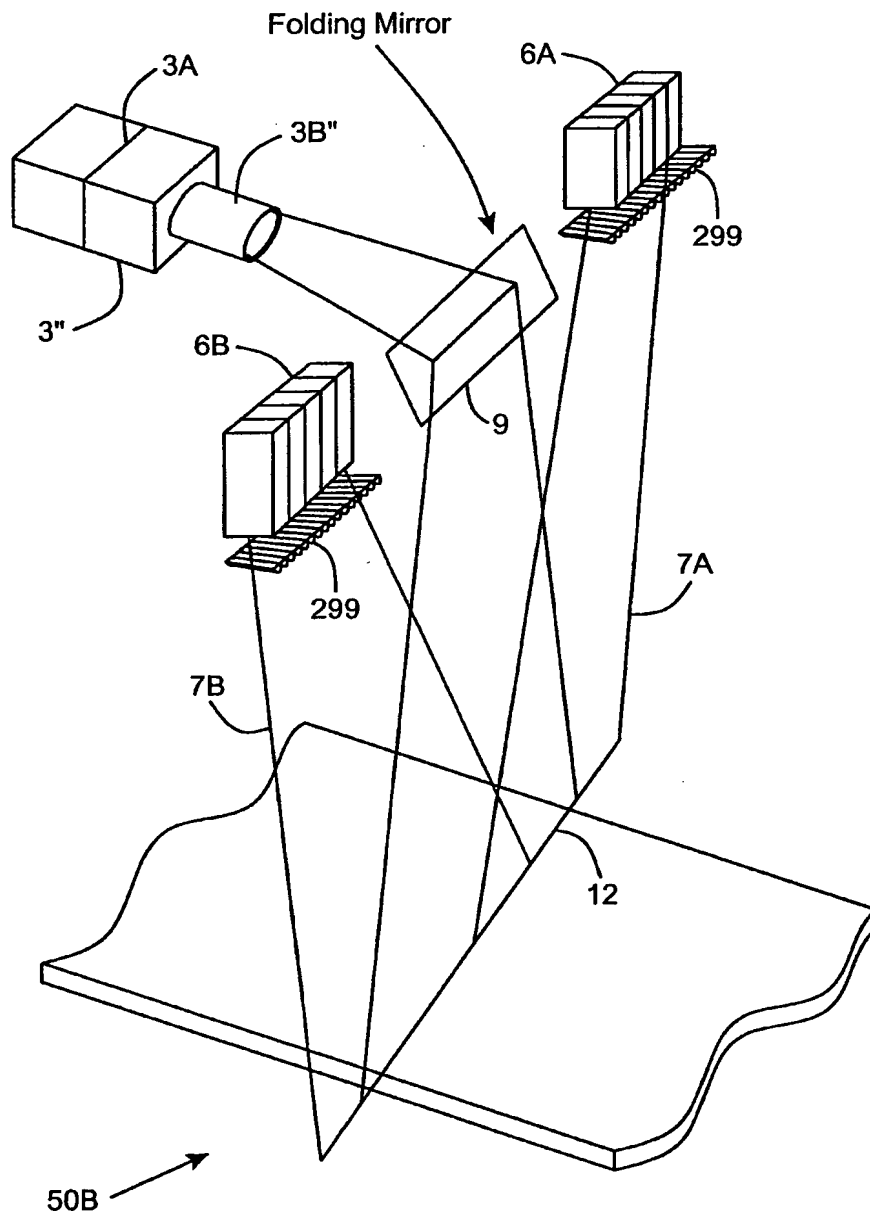


FIG. 3E1

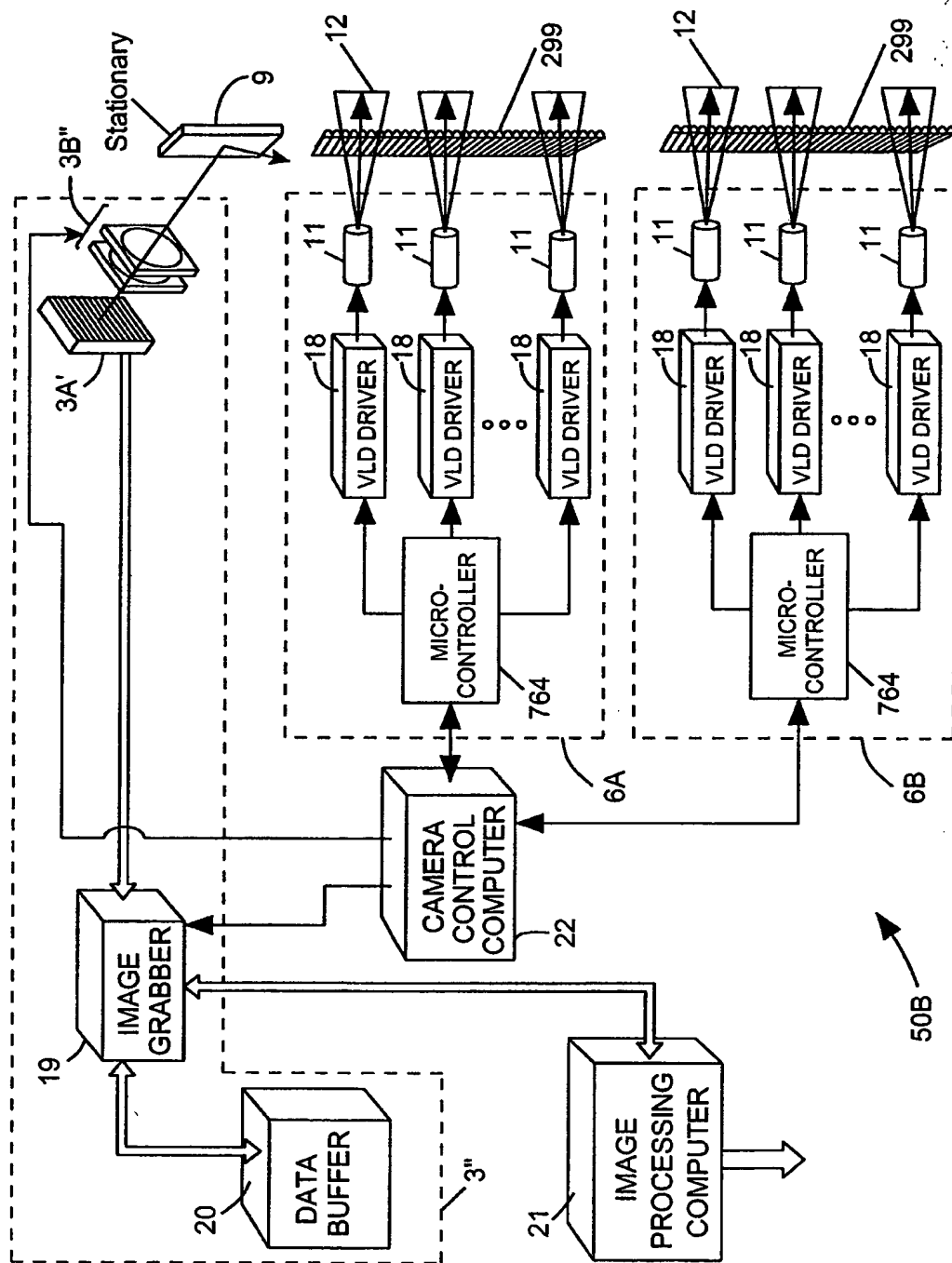


FIG. 3E2

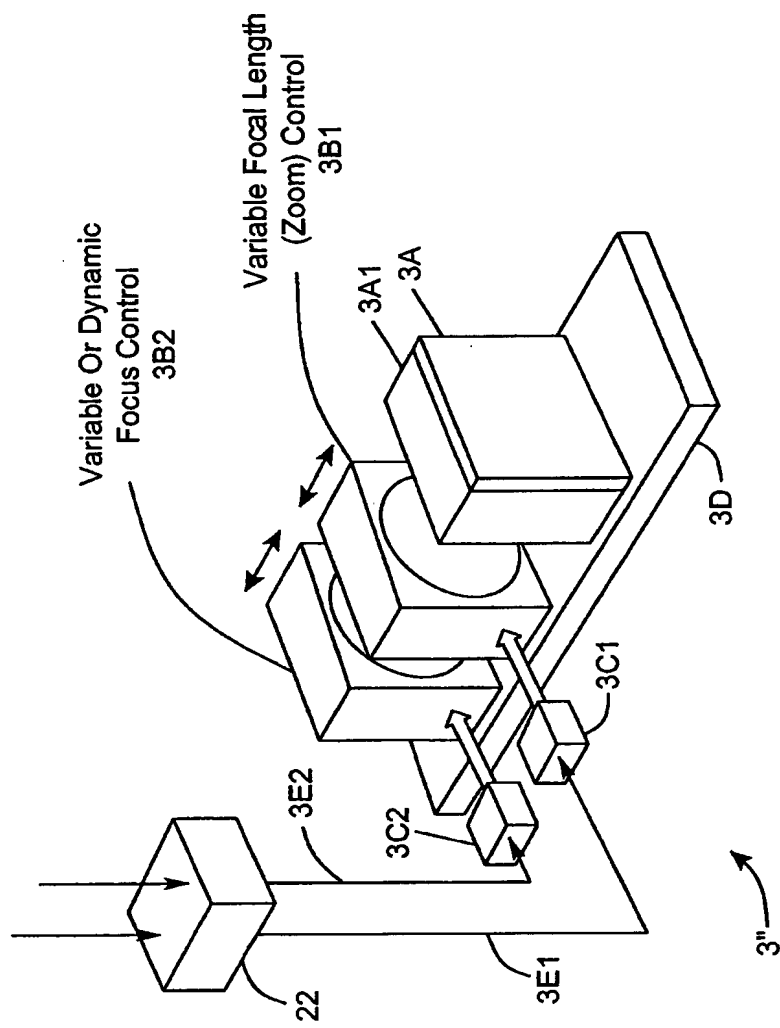


FIG. 3E3

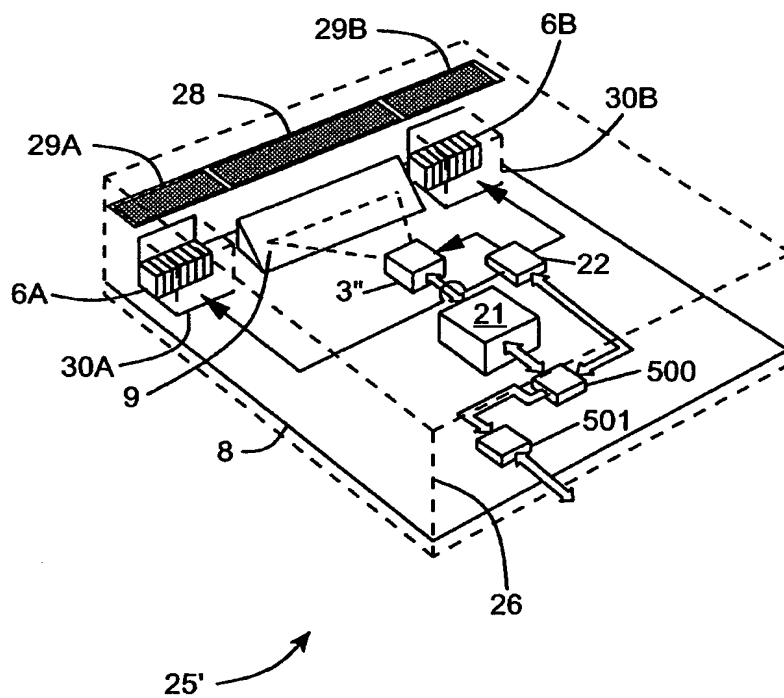


FIG. 3E4

20050207 04523001

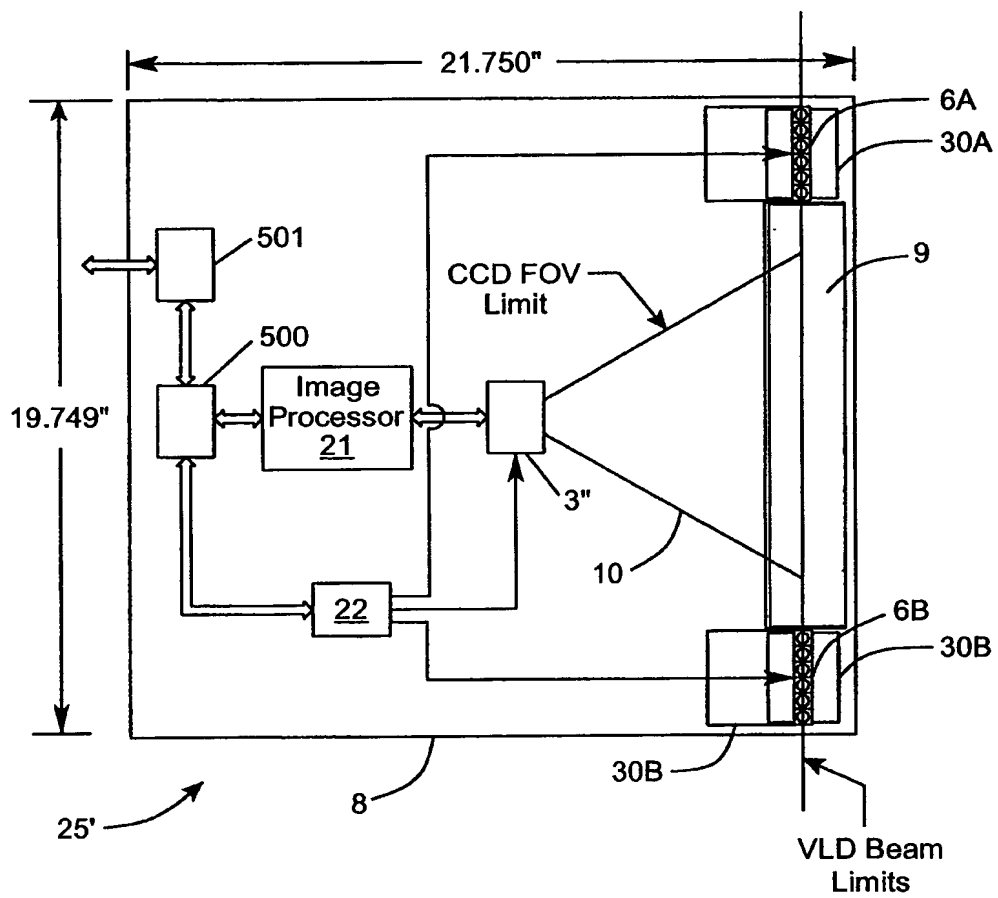


FIG. 3E5

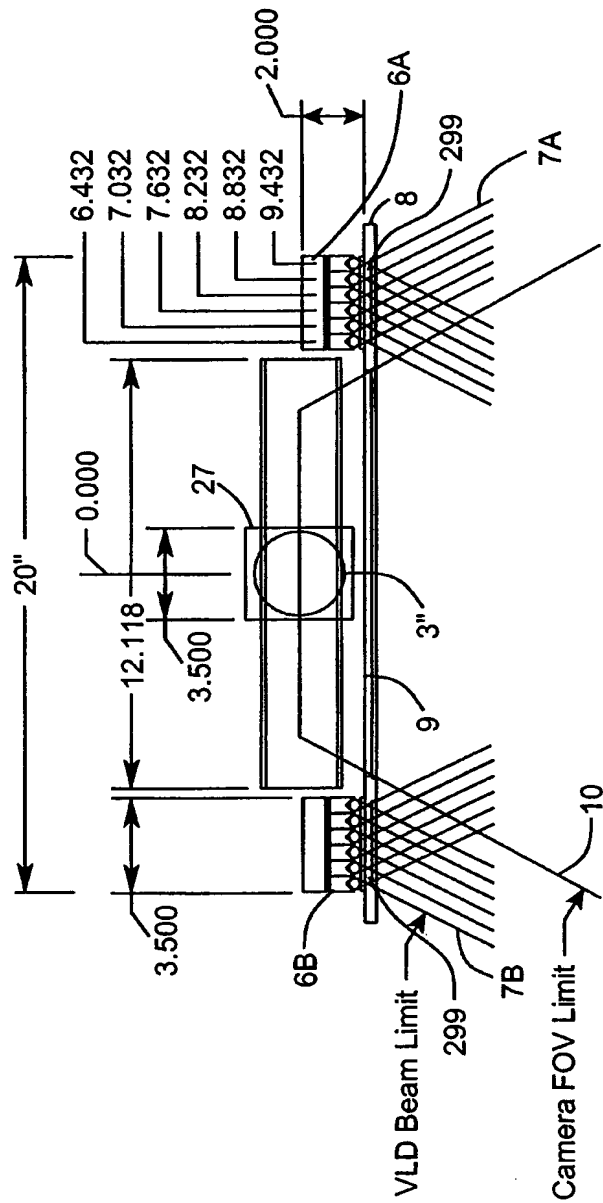


FIG. 3E6

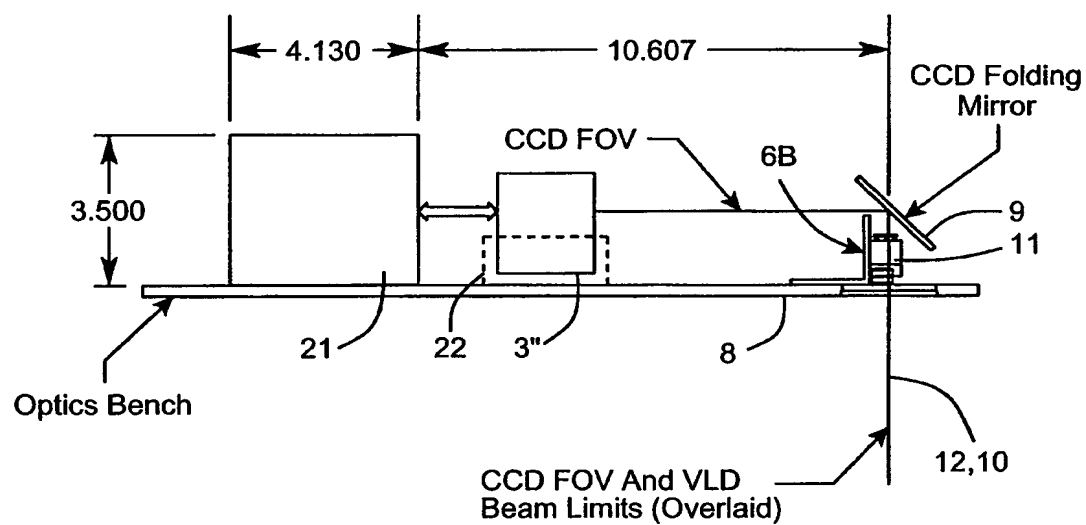


FIG. 3E7

2006020 07523004

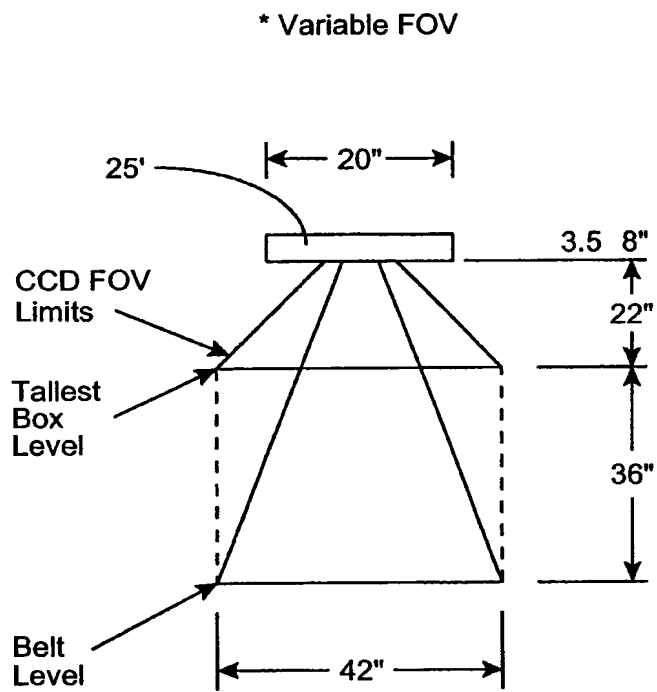


FIG. 3E8

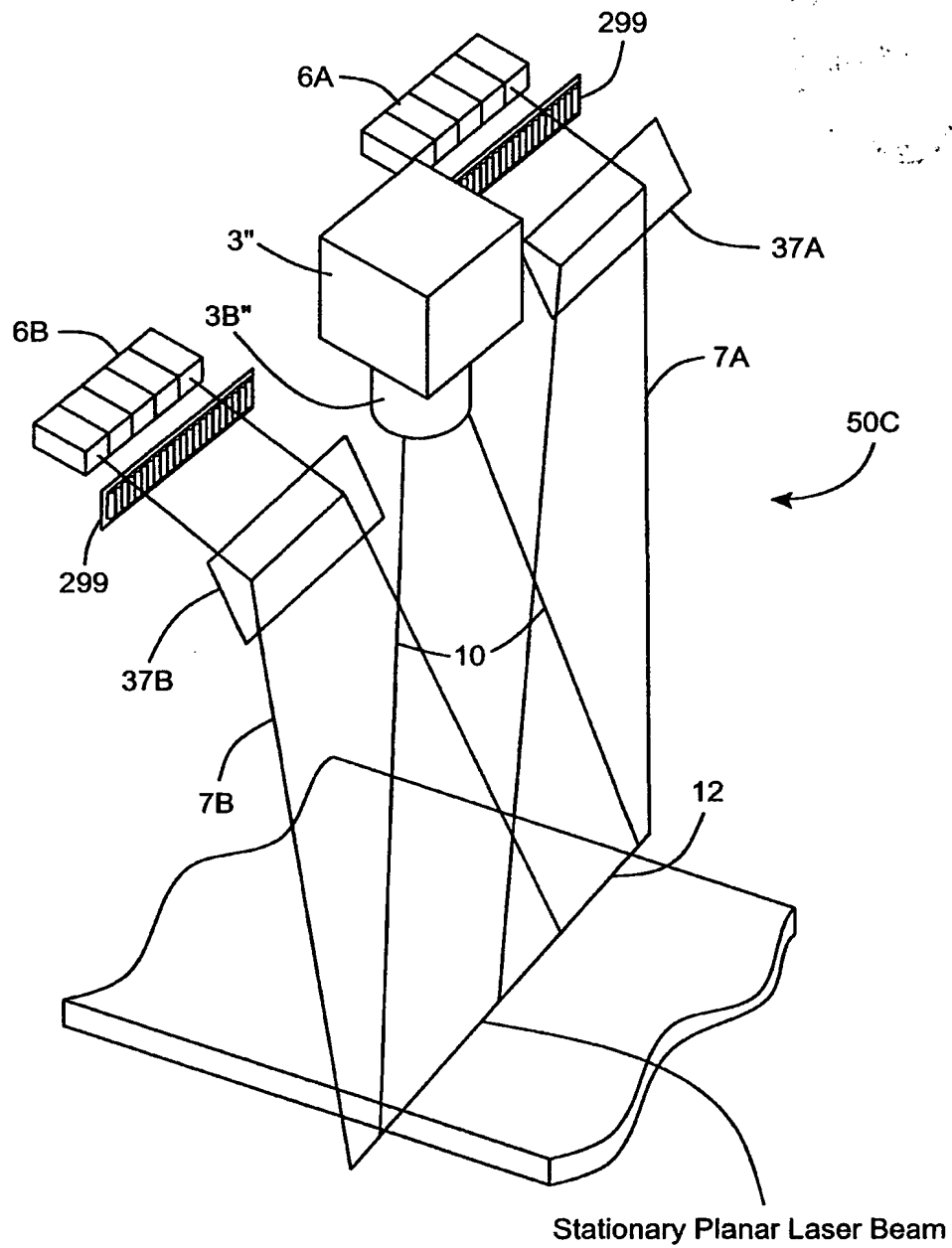


FIG. 3F1

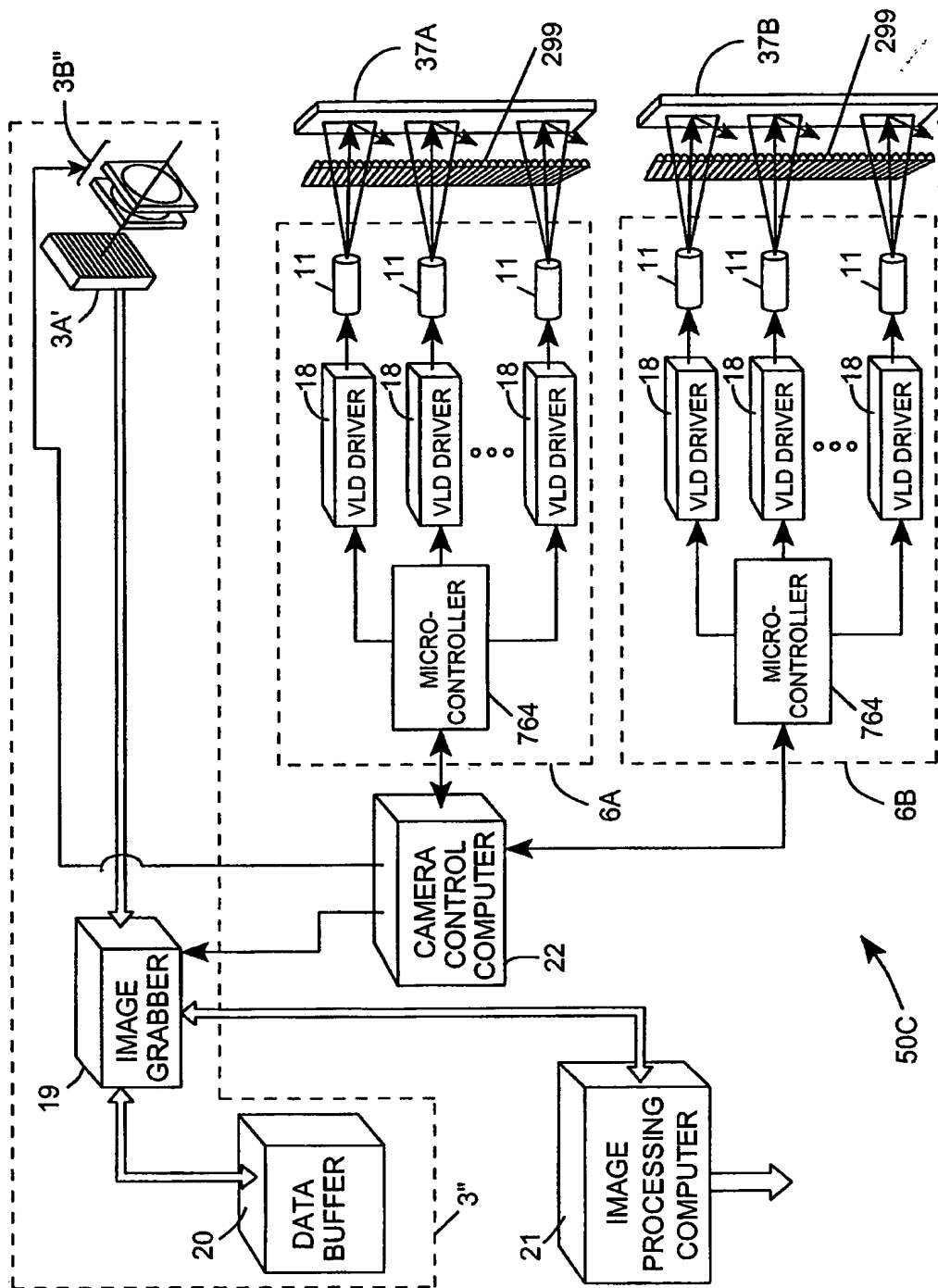


FIG. 3F2

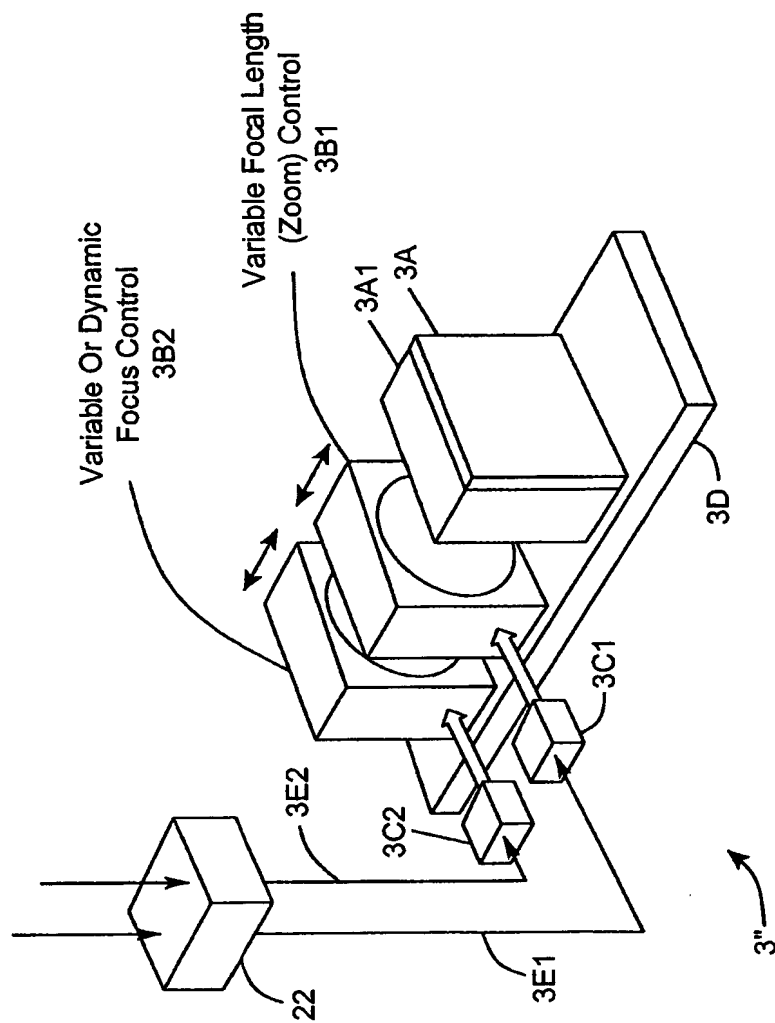


FIG. 3F3

2009020704529001

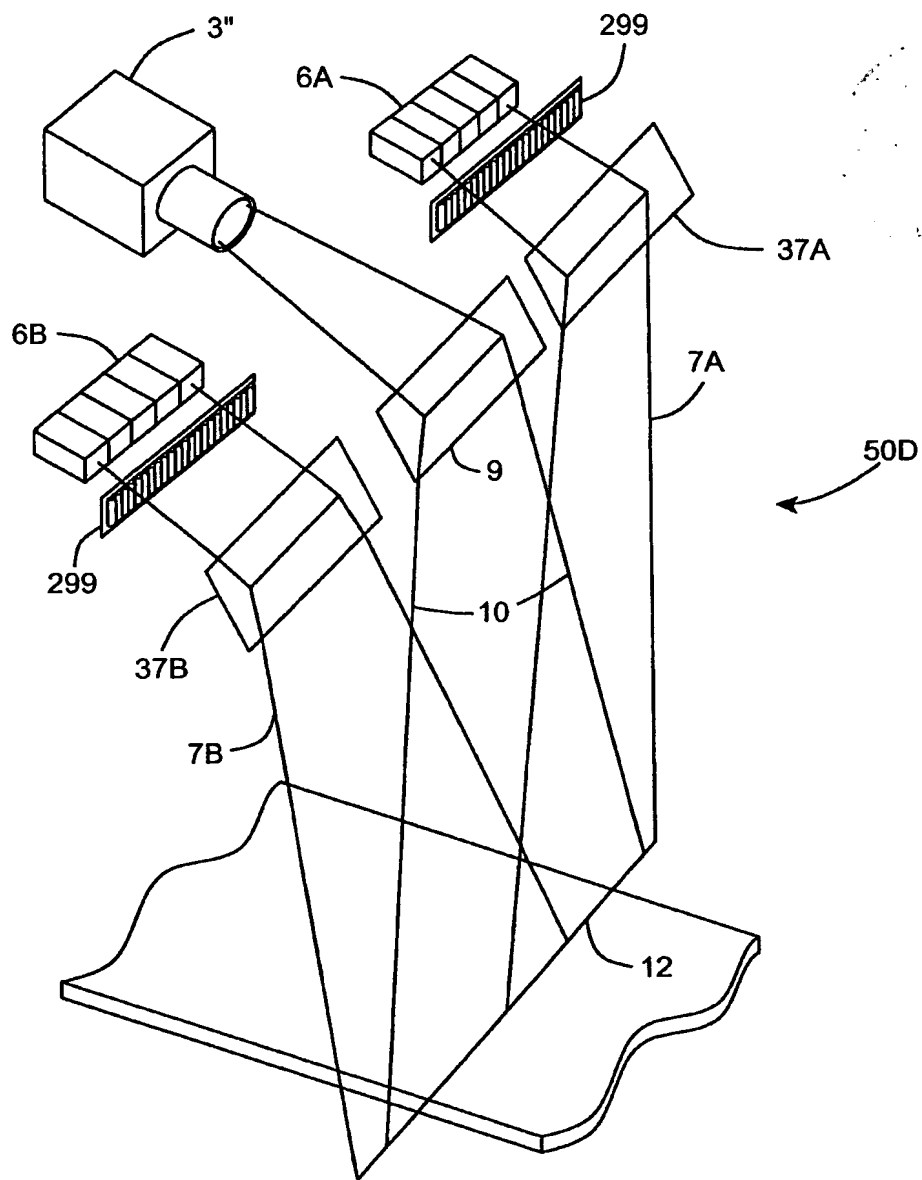


FIG. 3G1

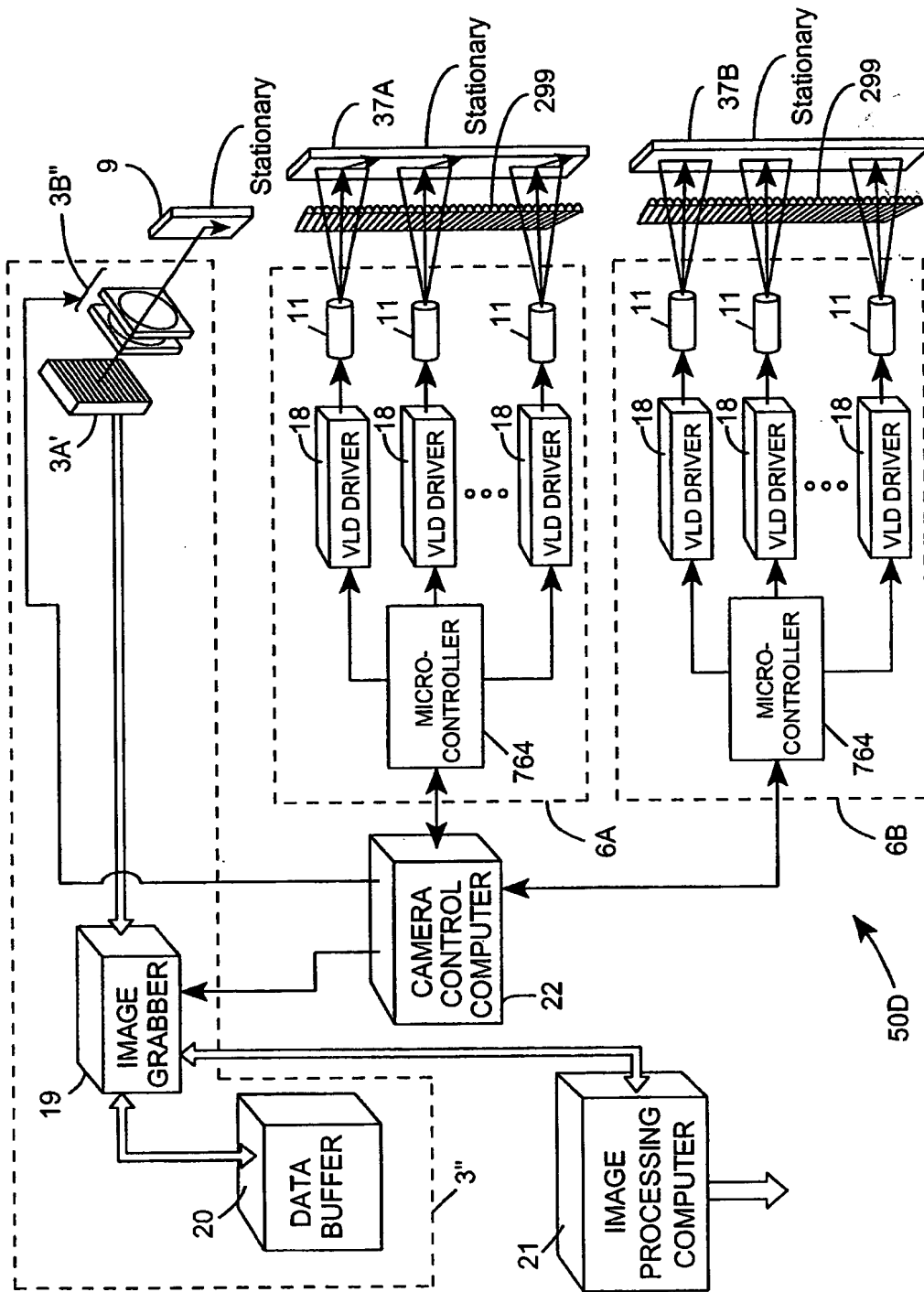


FIG. 3G2

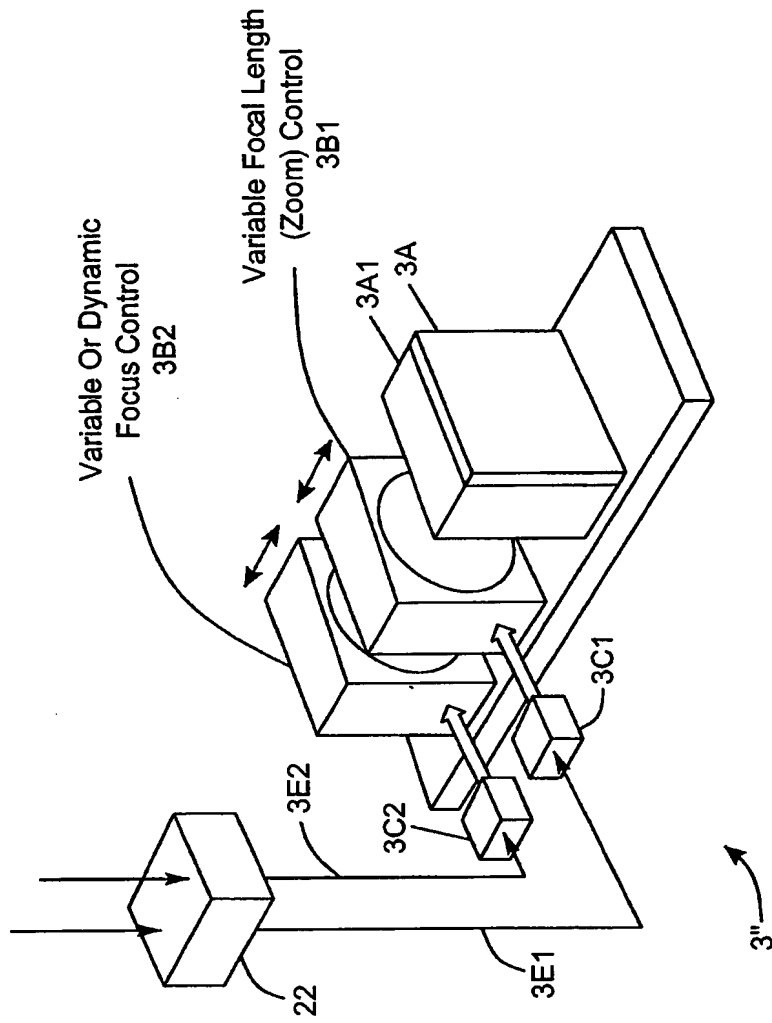


FIG. 3G3

- Variable Focal Length Imaging Lens
- Variable Focal Distance

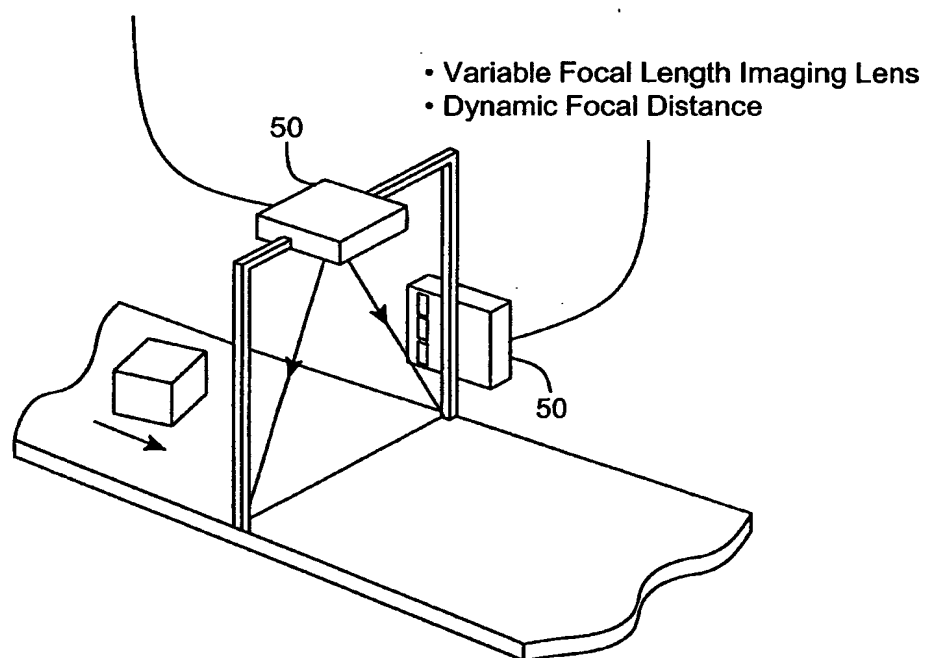


FIG. 3H

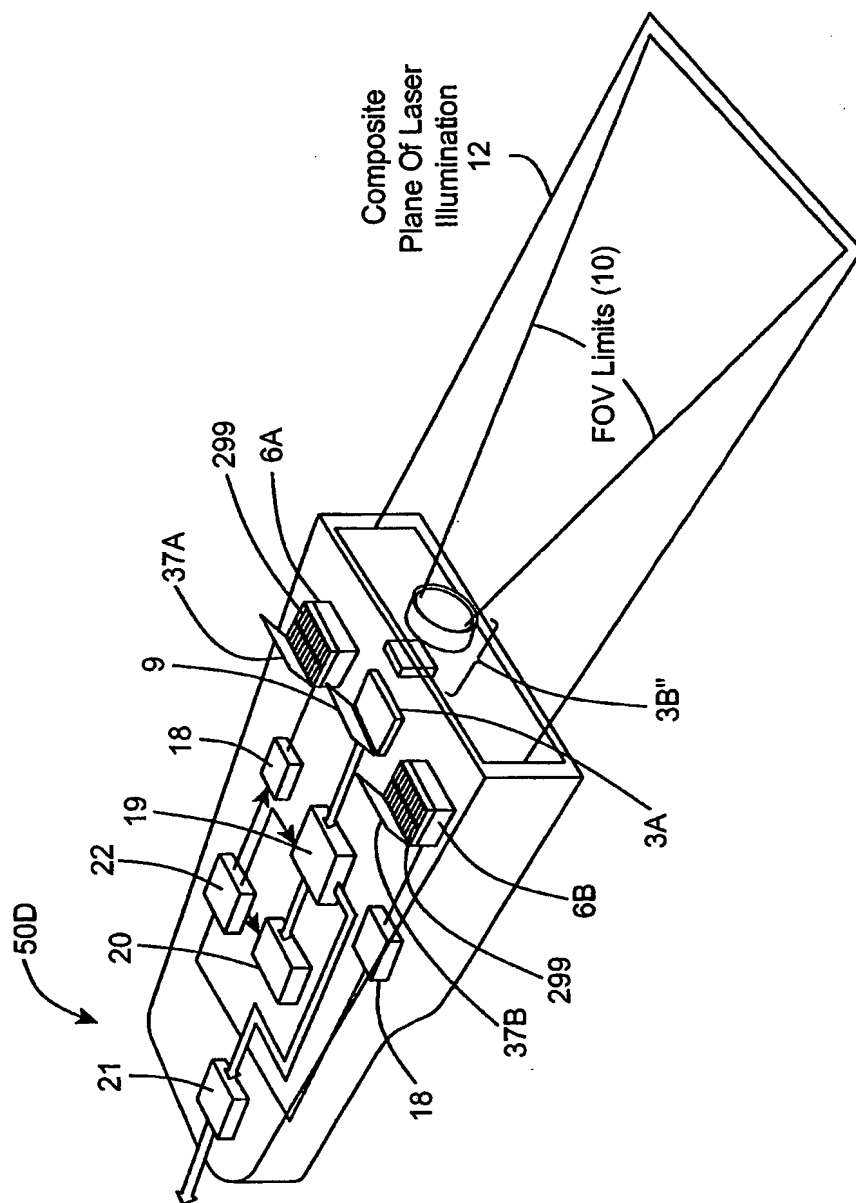


FIG. 31

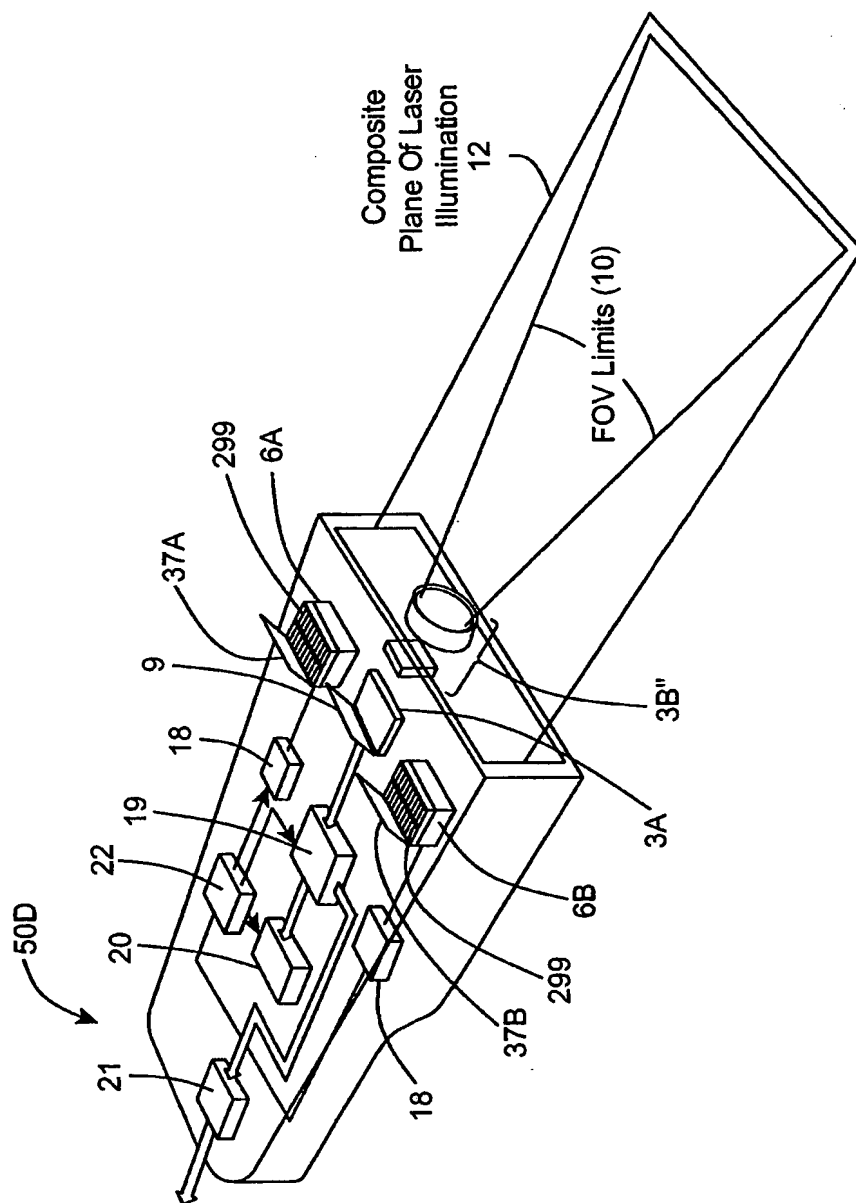
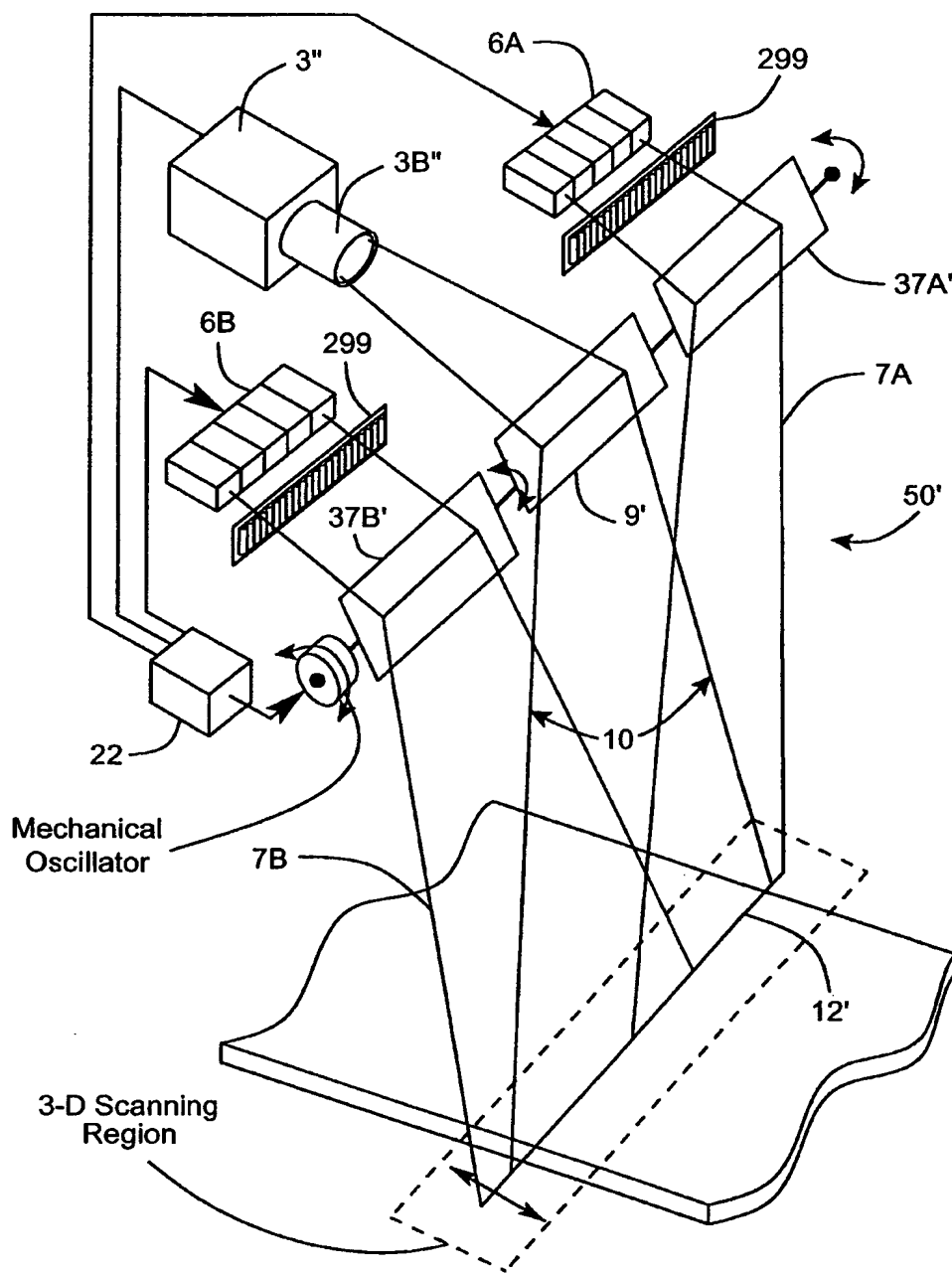


FIG. 31



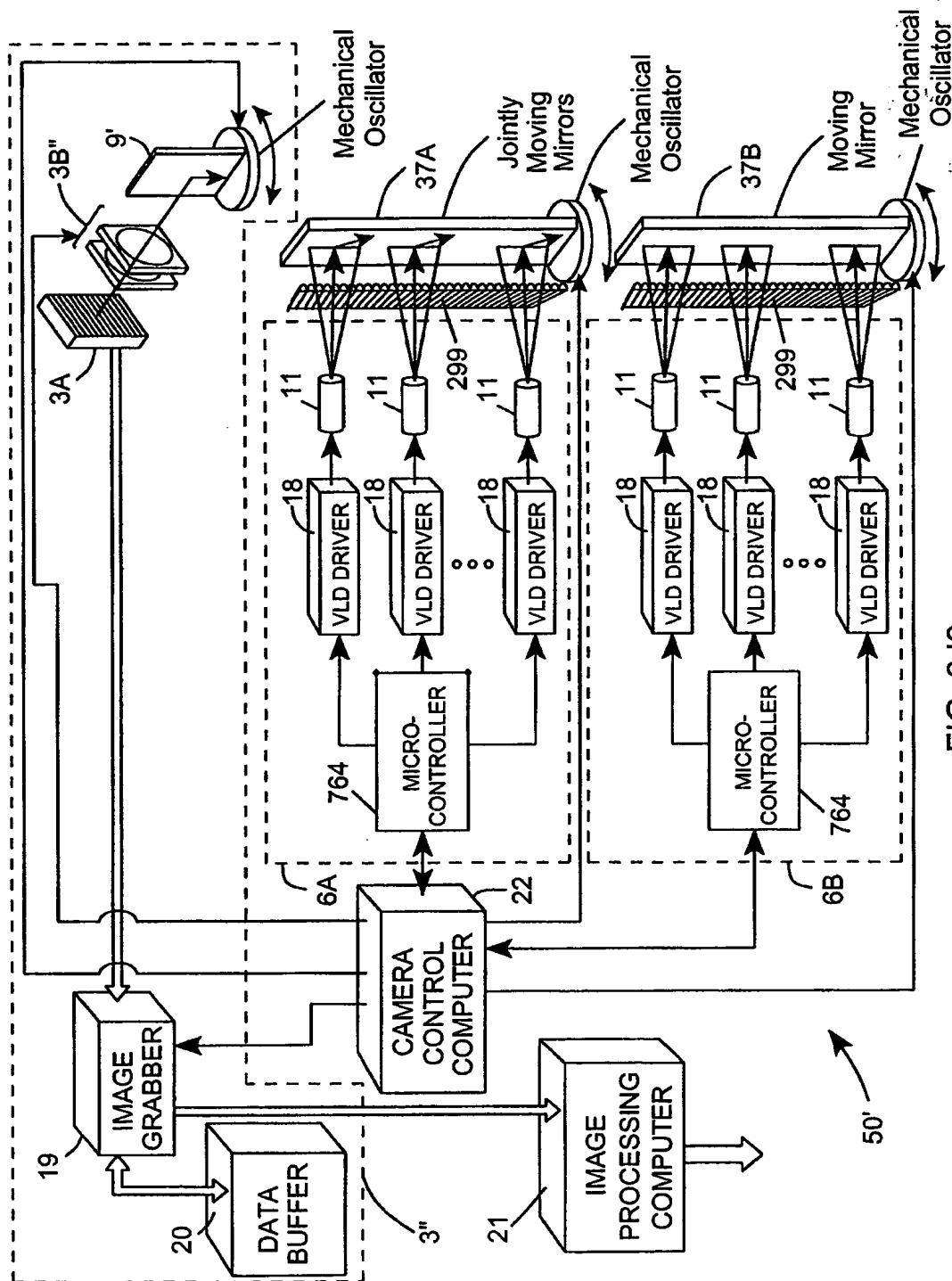


FIG. 3J3

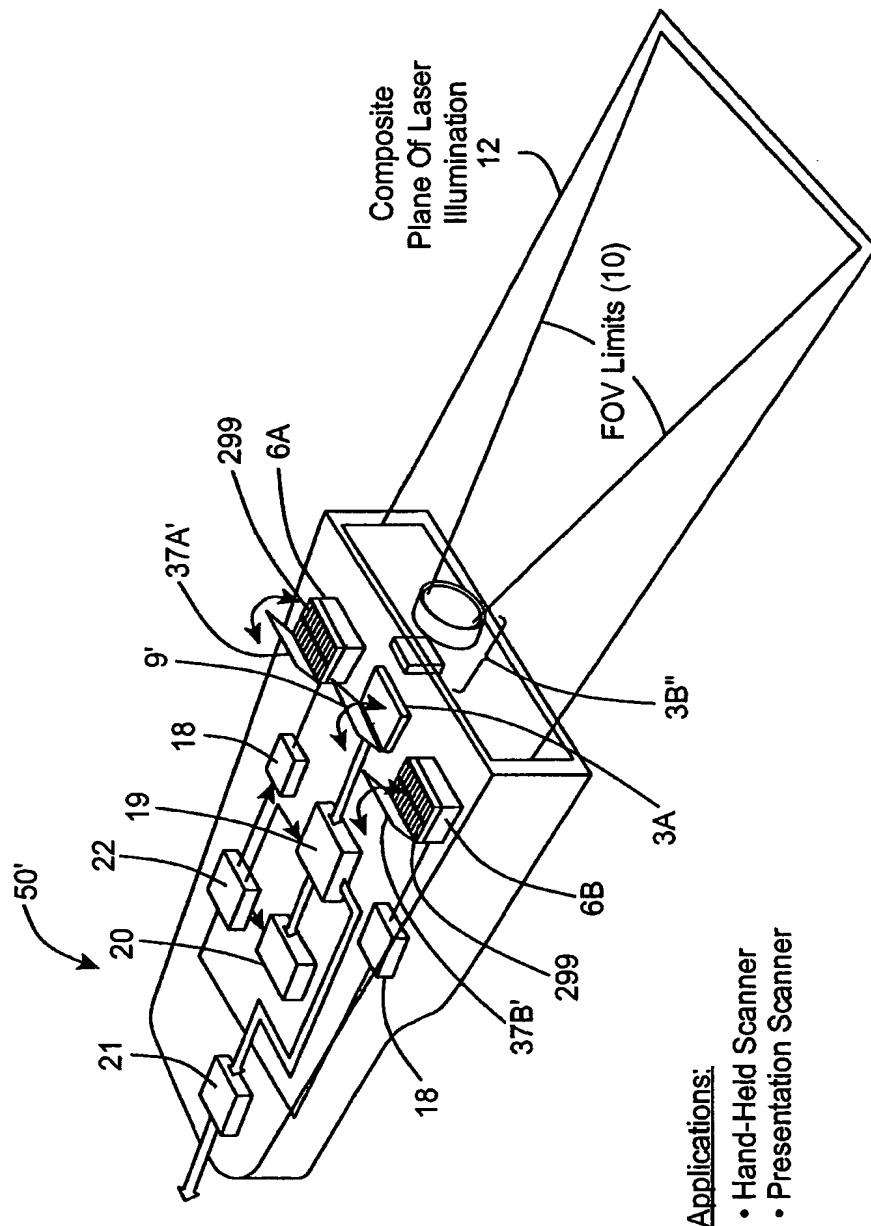
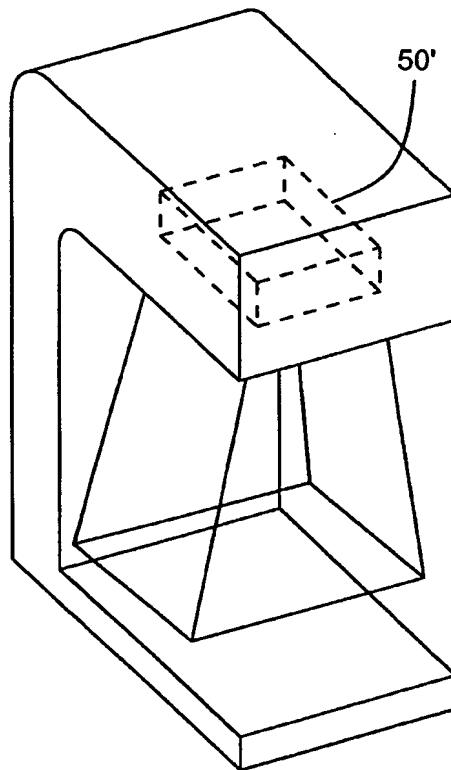


FIG. 3J5

Applications:

- Hand-Held Scanner
- Presentation Scanner

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2-D Hold-under Scanner

FIG. 3J6

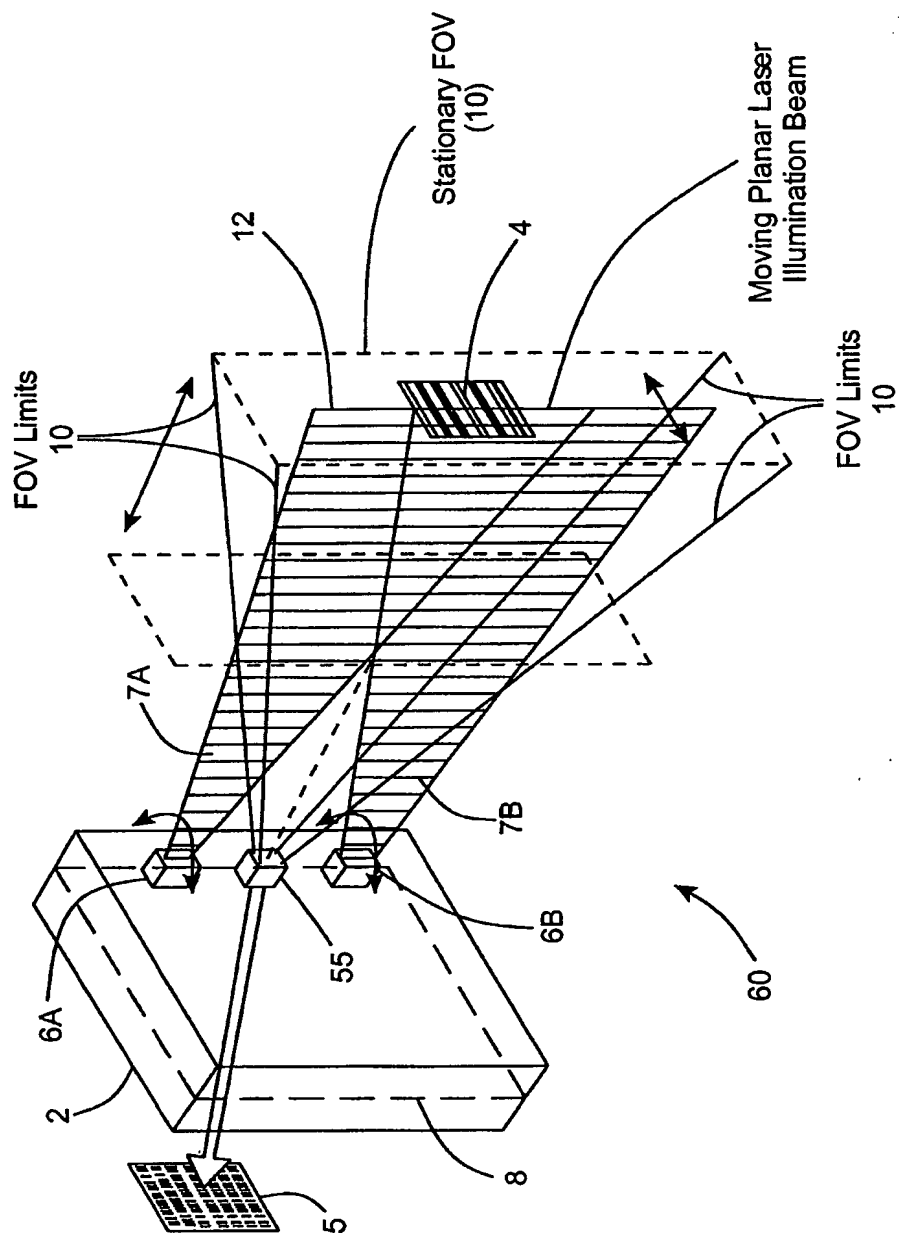


FIG. 4A

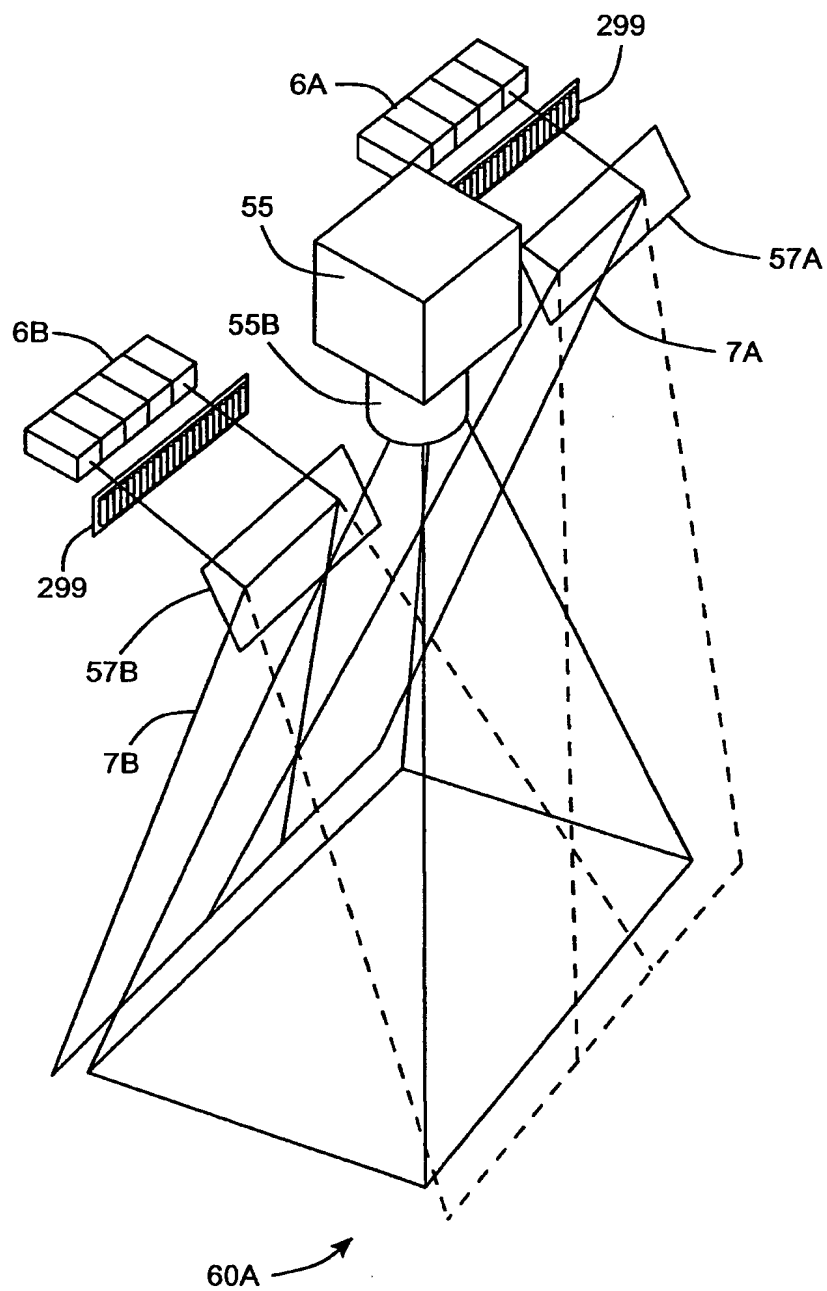


FIG. 4B1

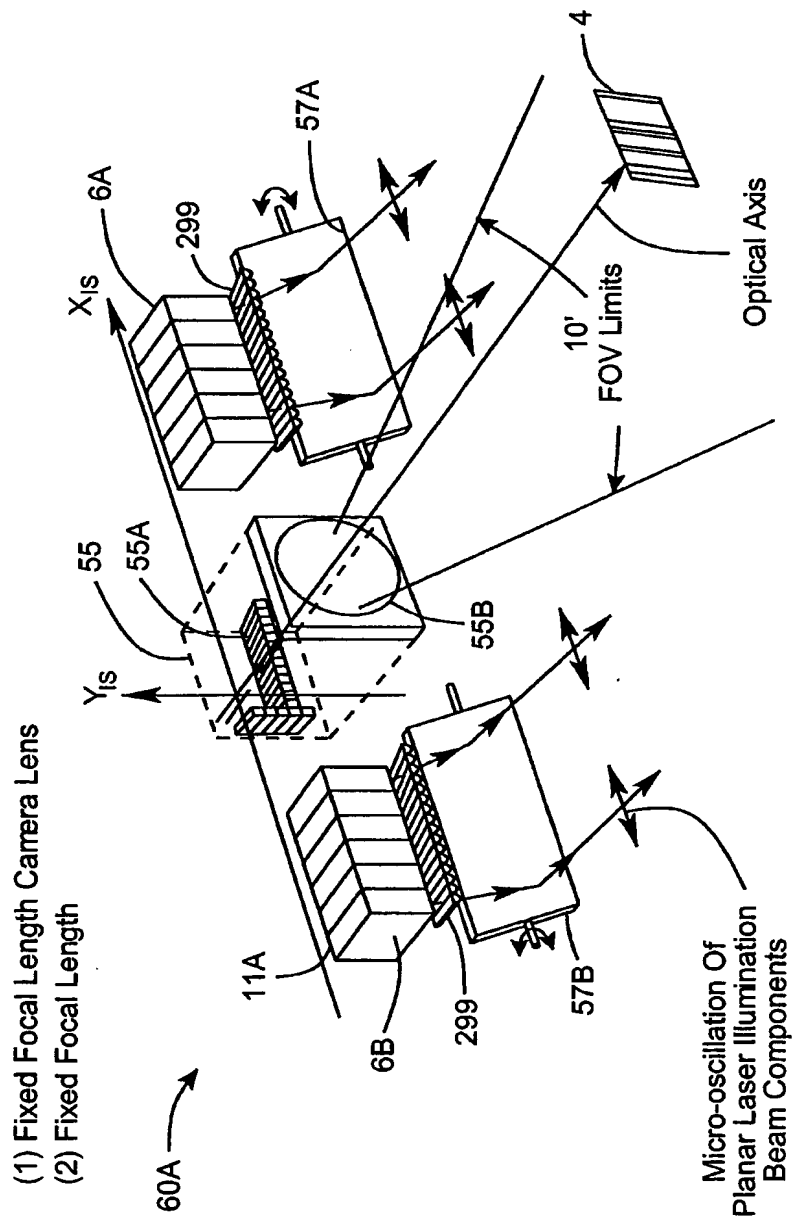
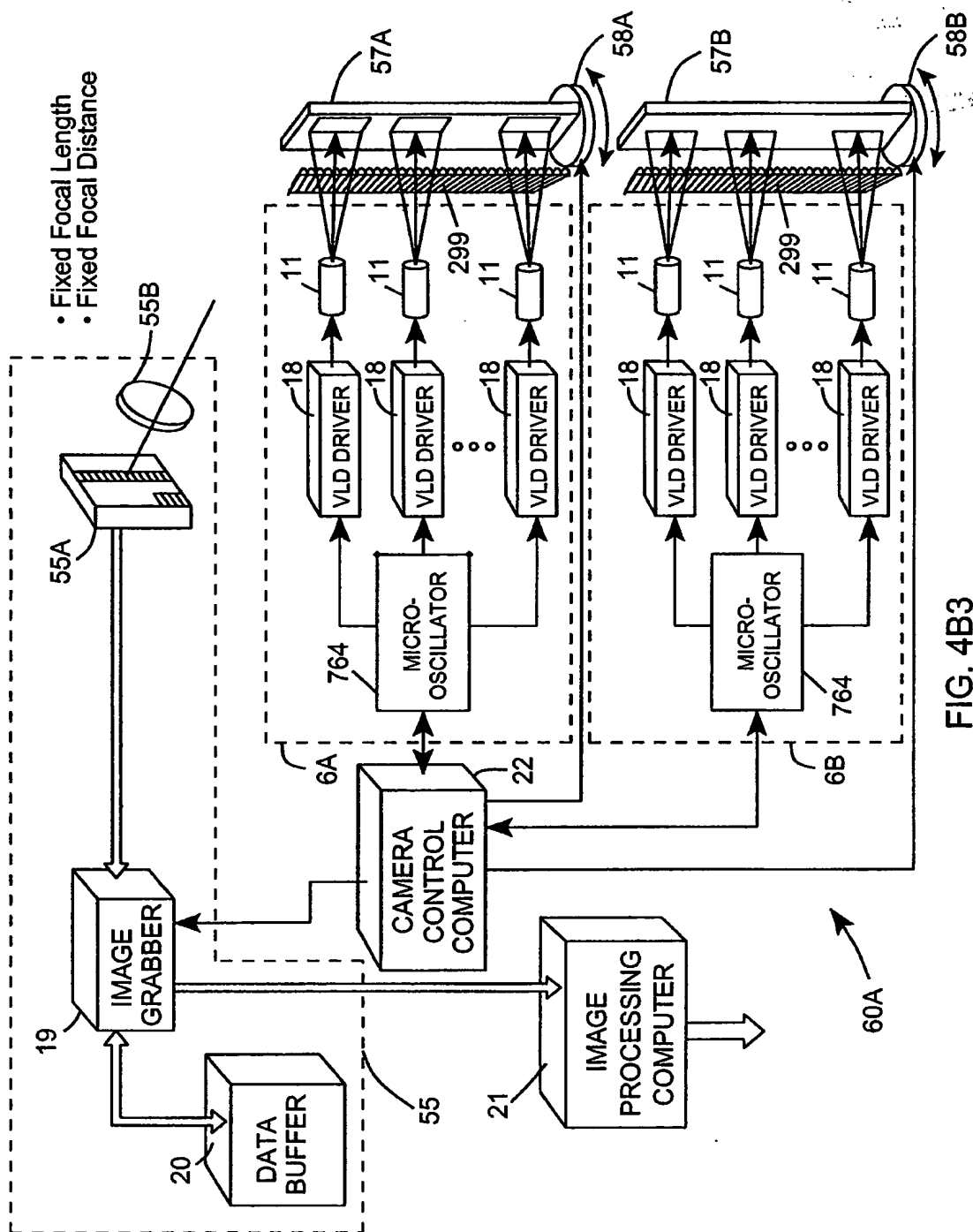


FIG. 4B2



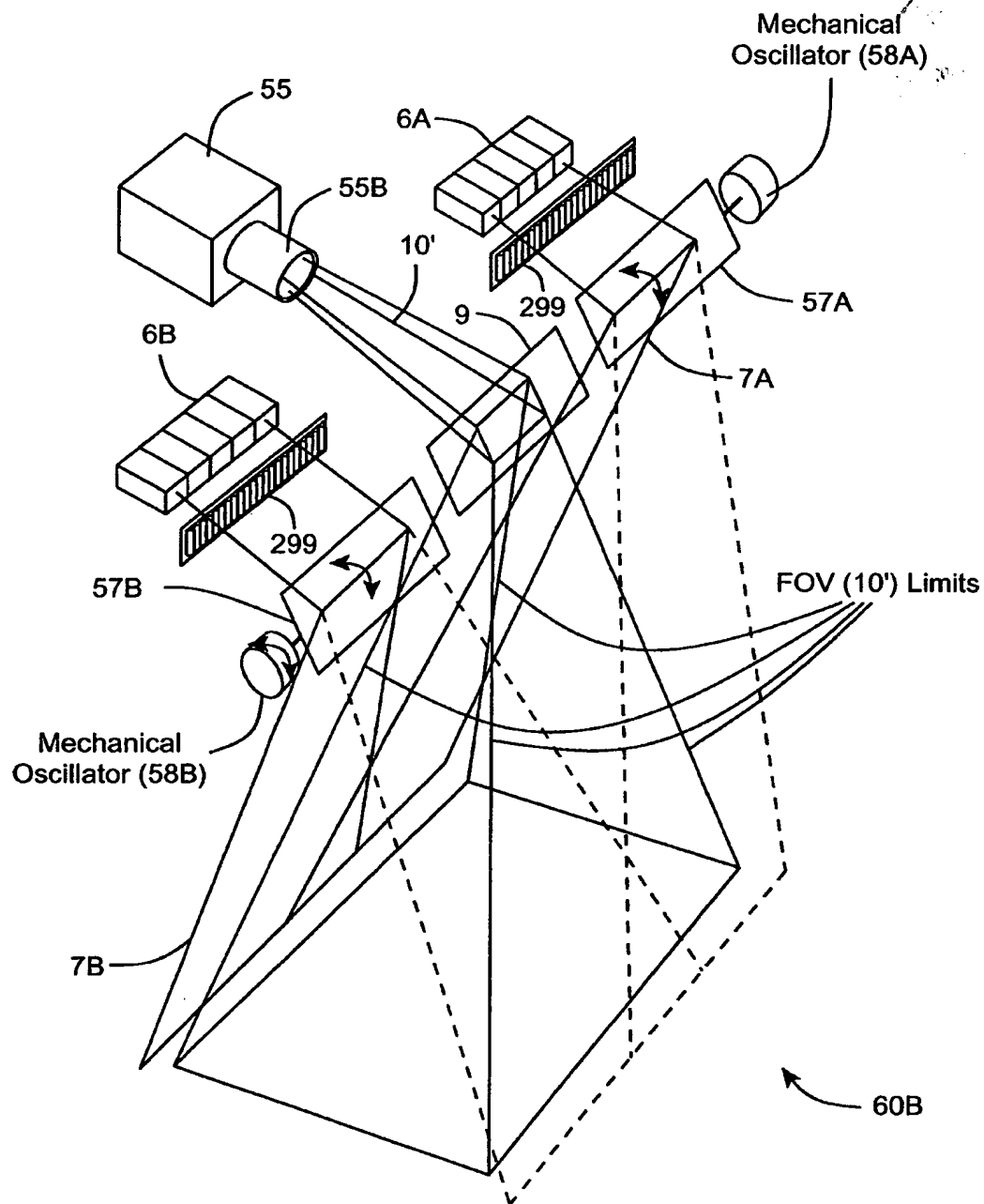


FIG. 4C1

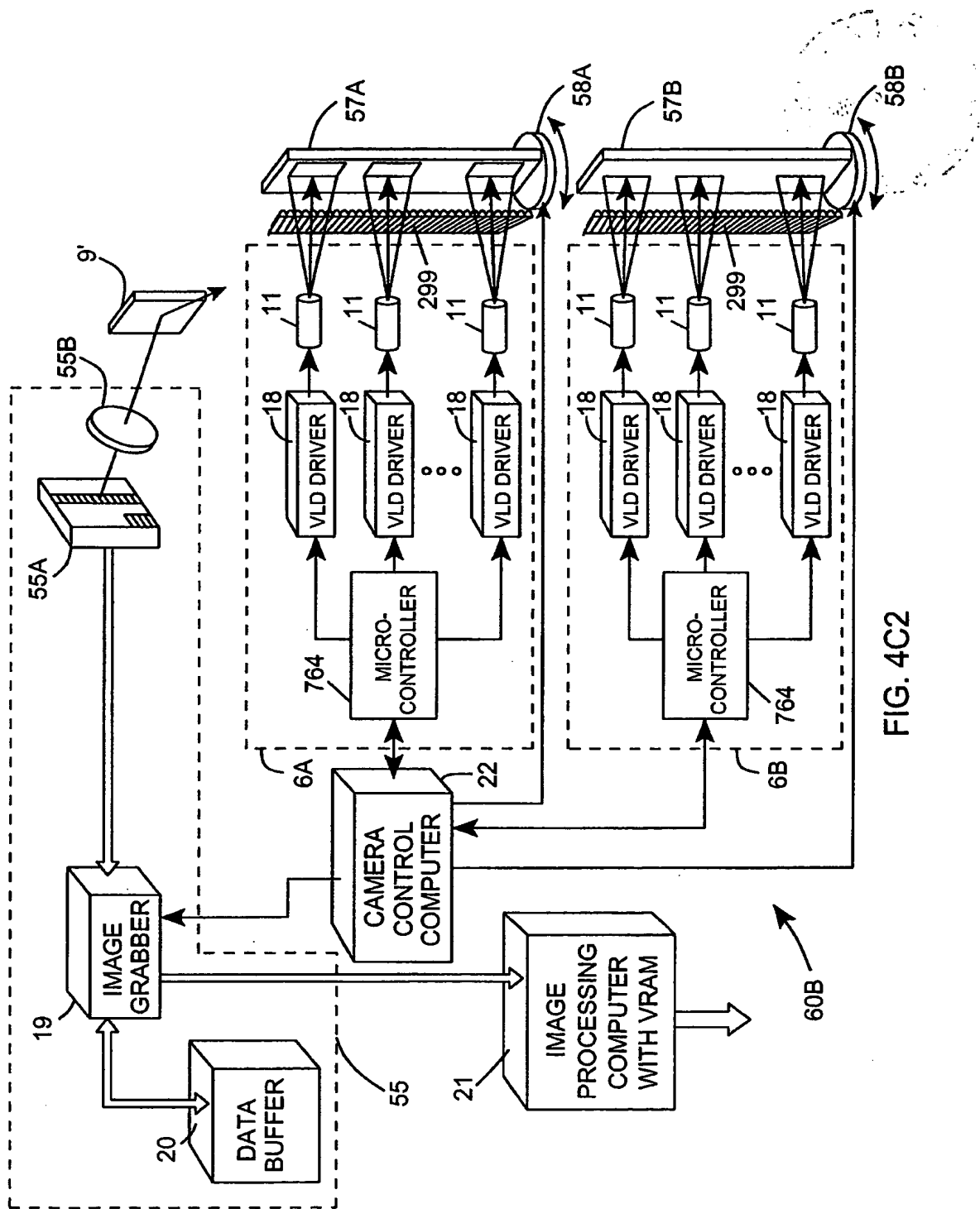
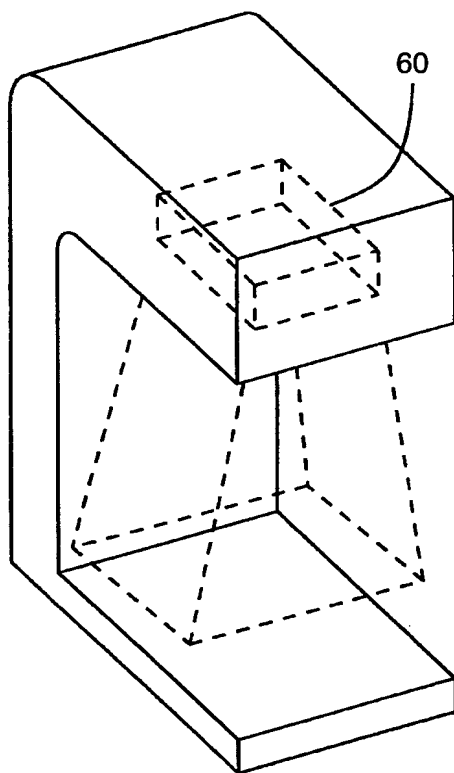


FIG. 4C2



2-D Hold-under Scanner

FIG. 4D

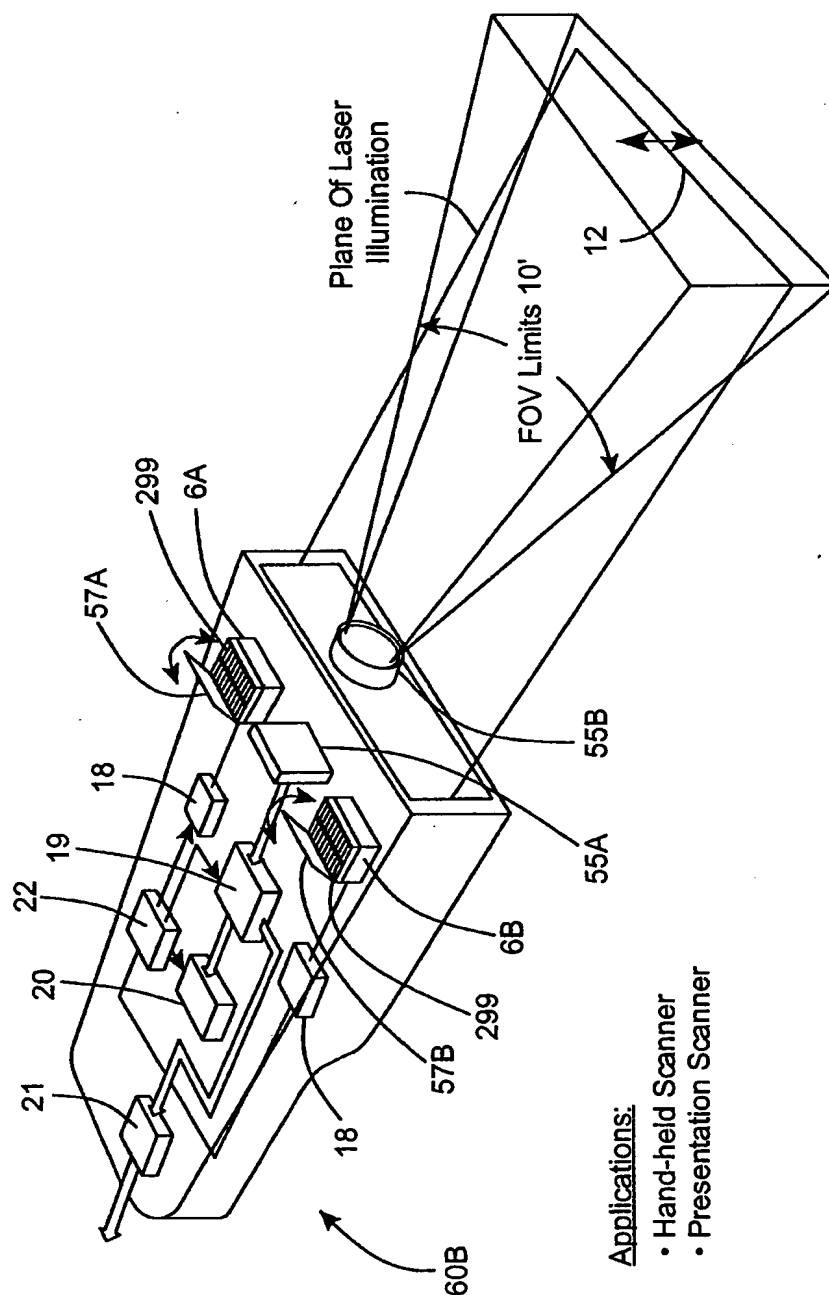
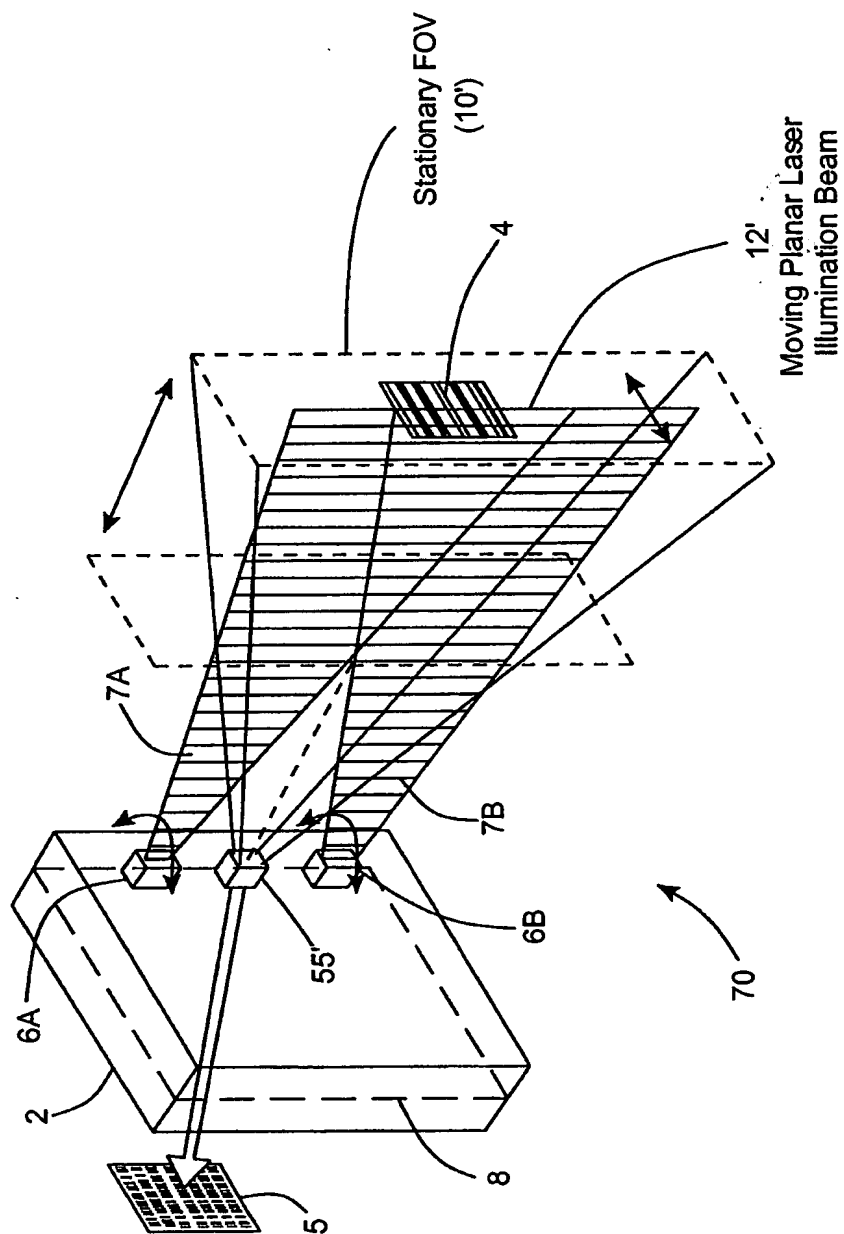


FIG. 4E



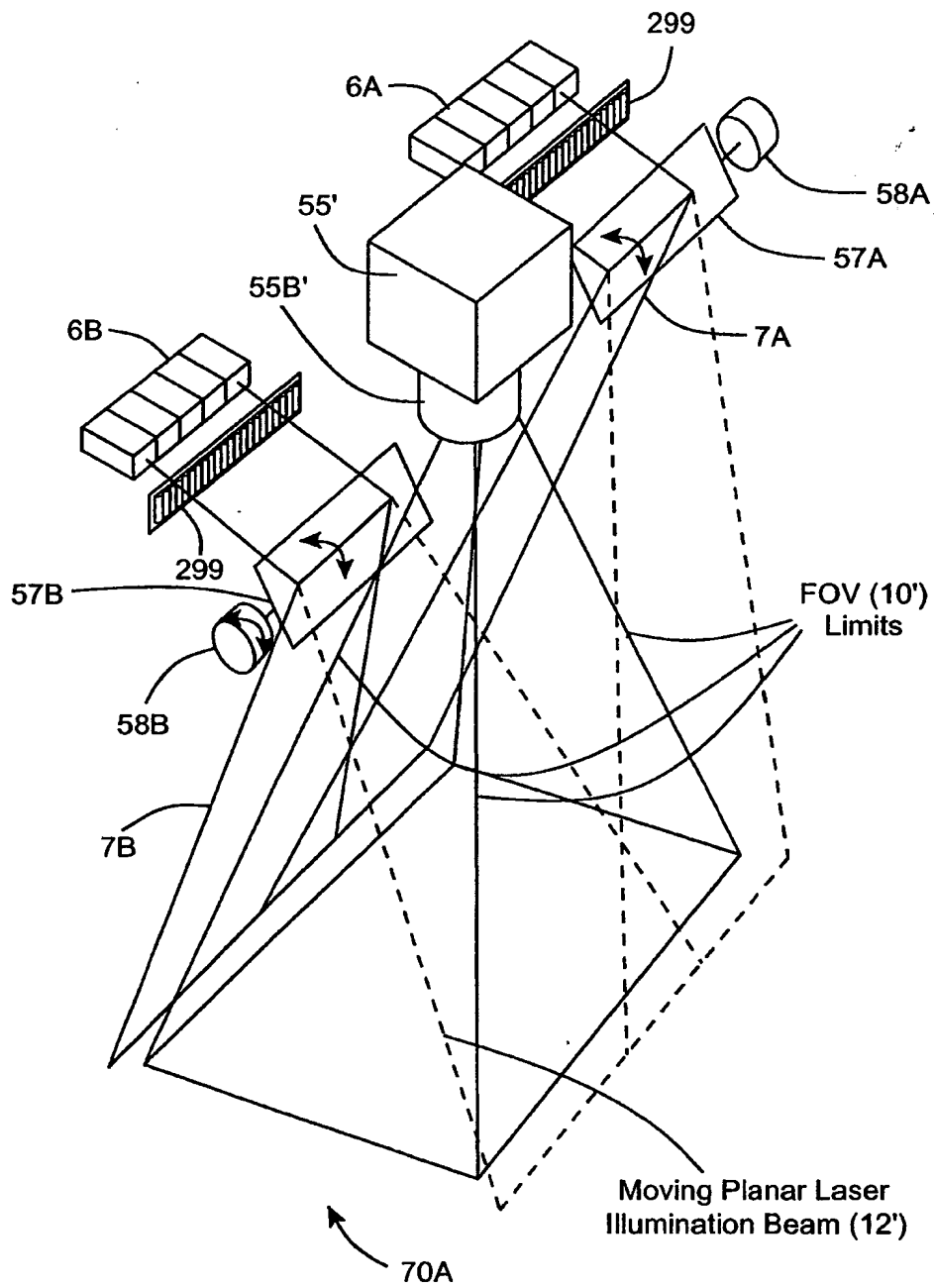


FIG. 5B1

- (1) Fixed Focal Length Camera Lens
- (2) Variable Focal Distance

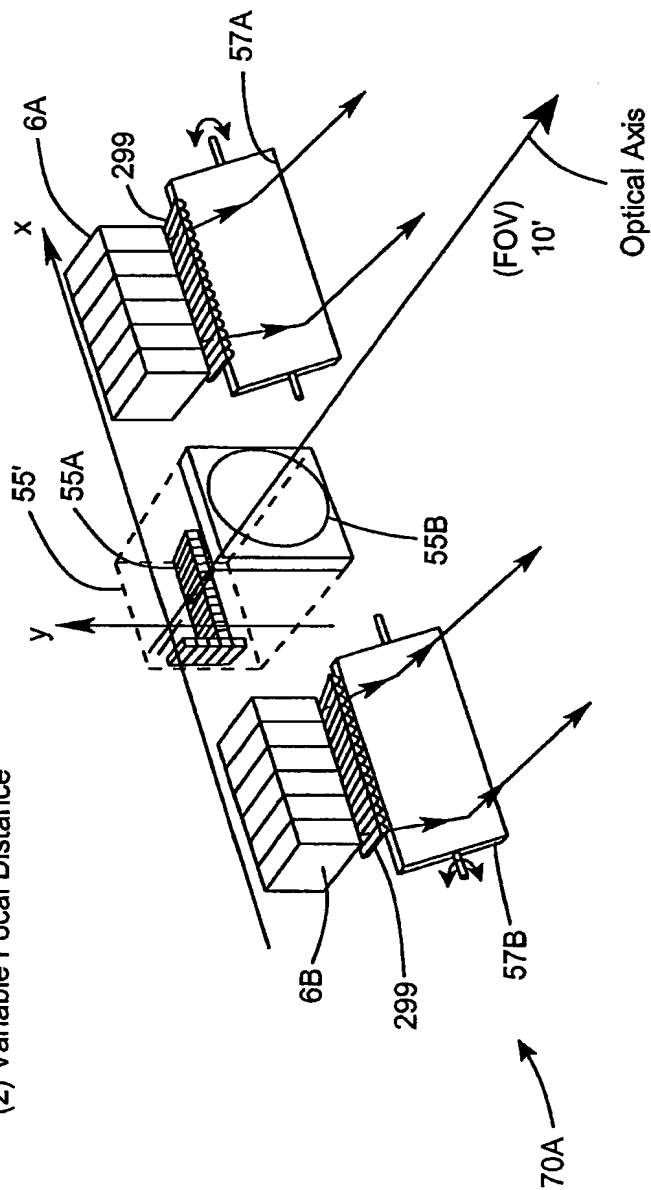


FIG. 5B2

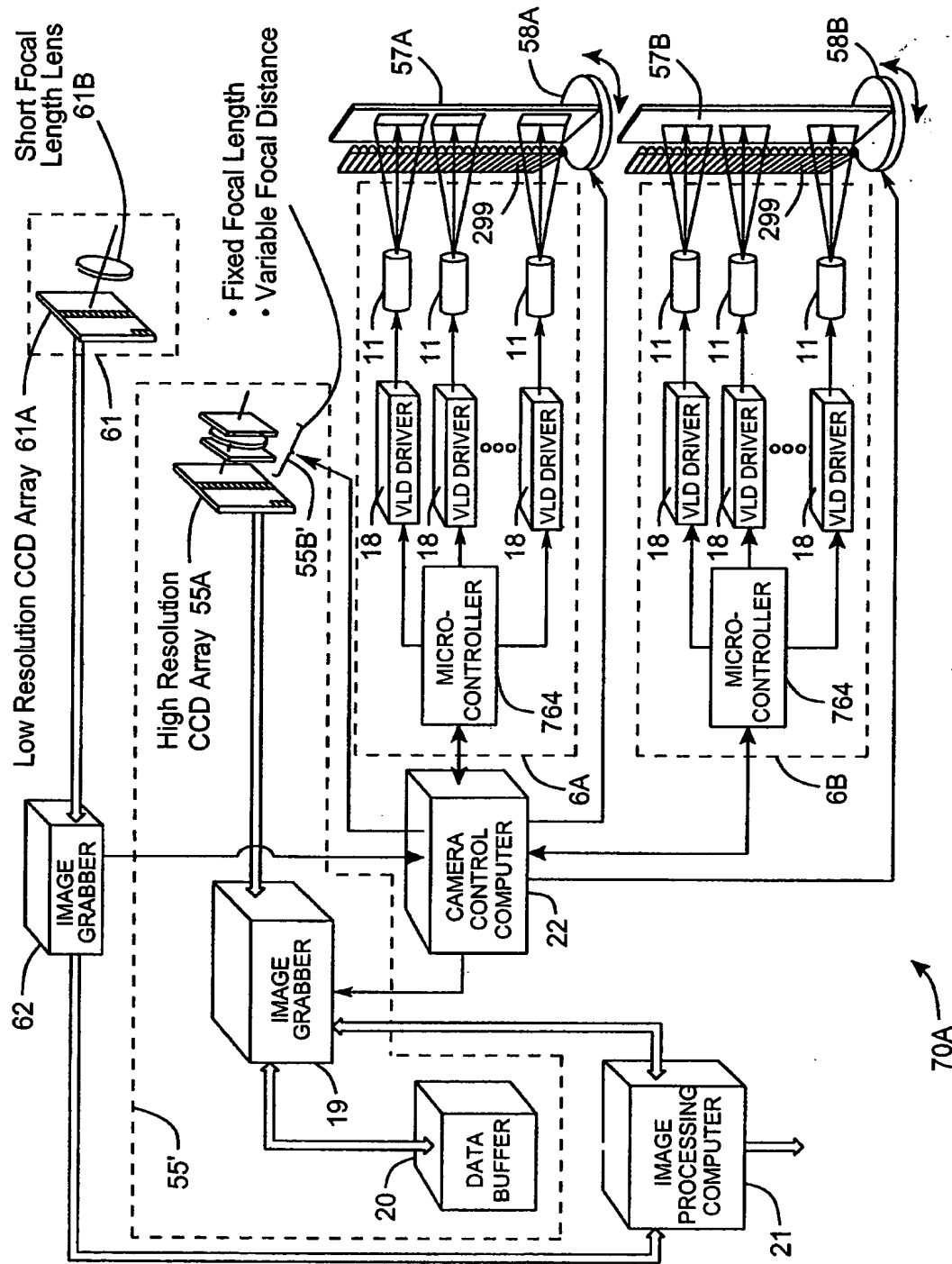


FIG. 5B3

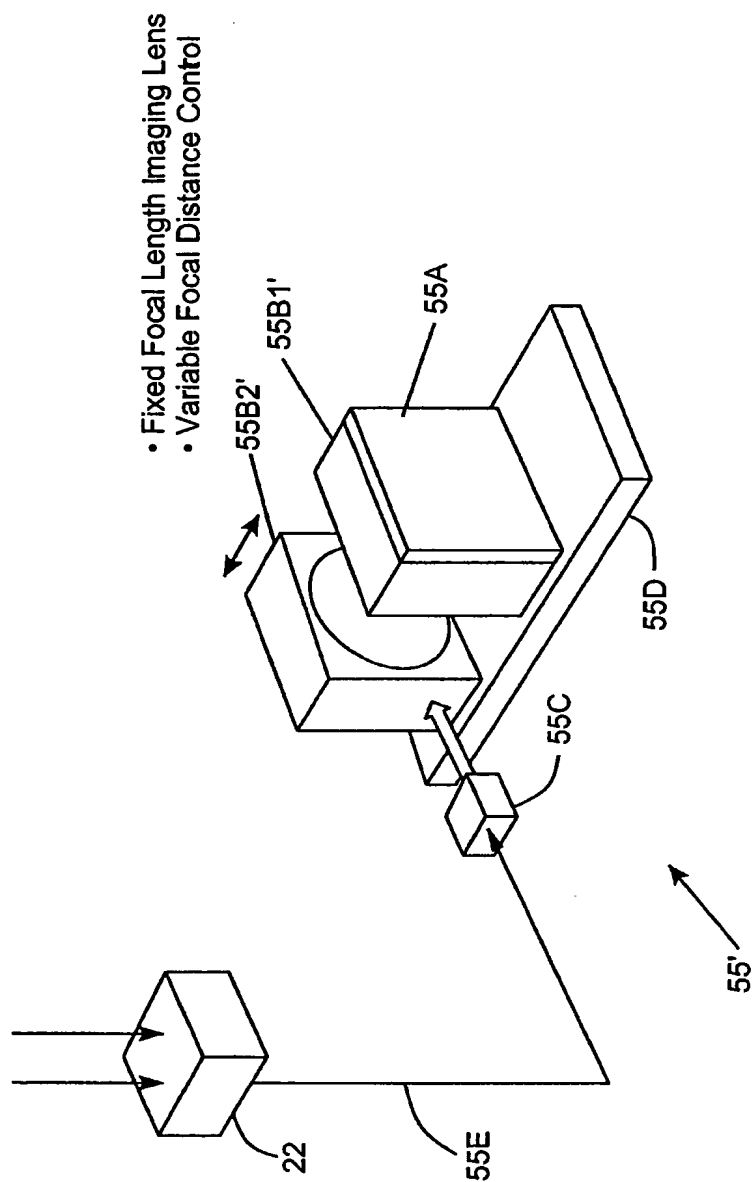


FIG. 5B4

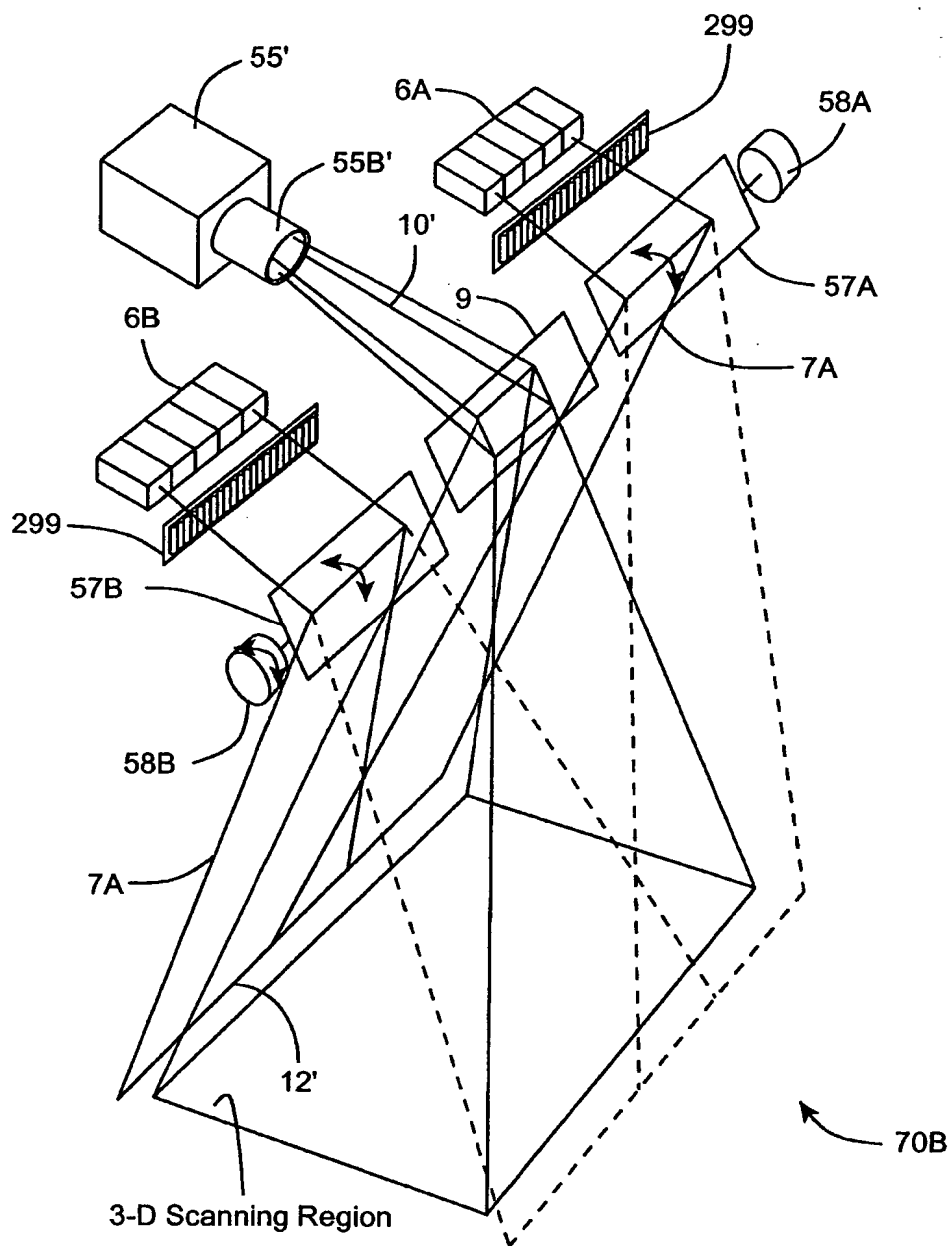


FIG. 5C1

- (1) Variable Focal Length Camera Lens
- (2) Fixed Focal Distance

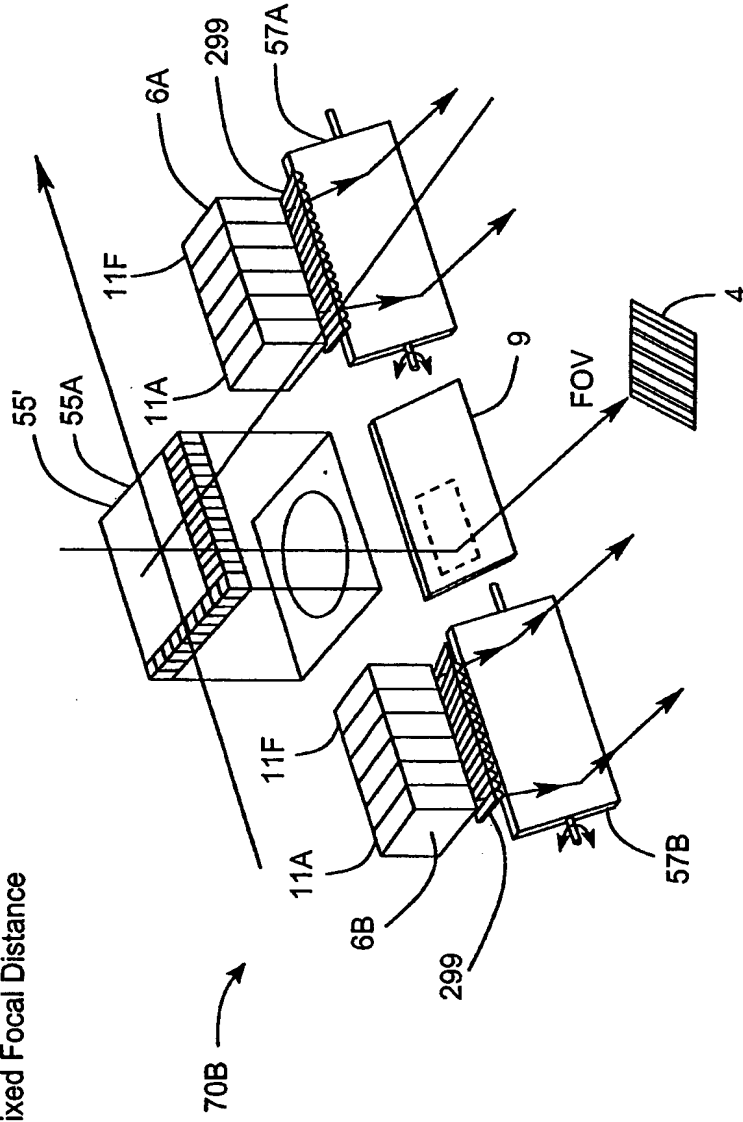


FIG. 5C2

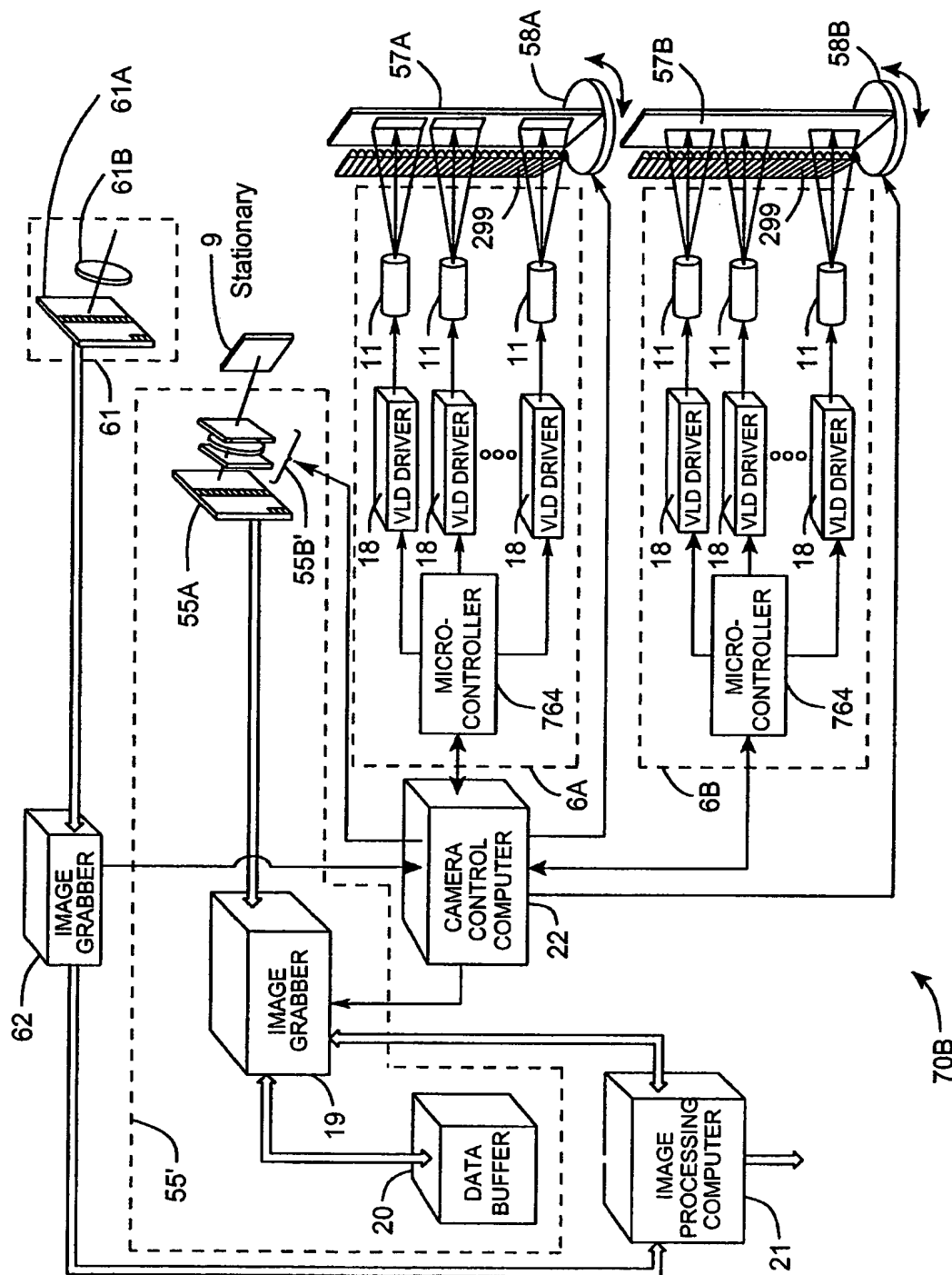


FIG. 5C3

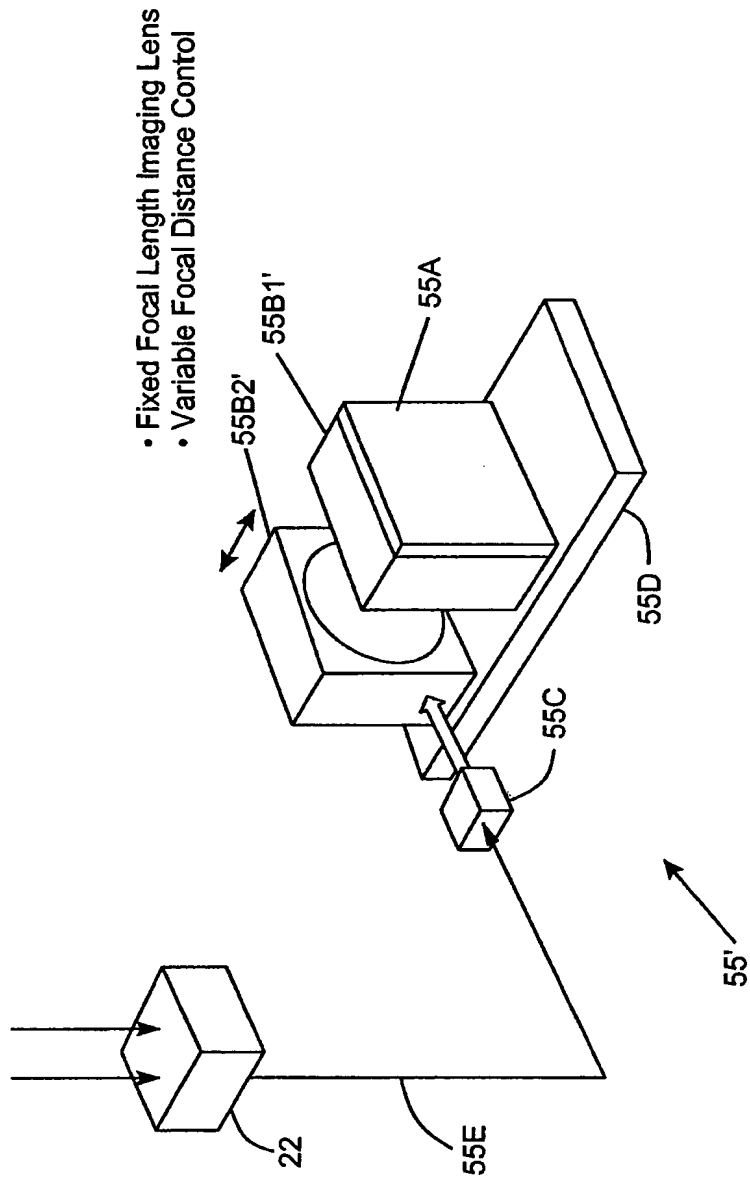


FIG. 5C4

206020 0492900F

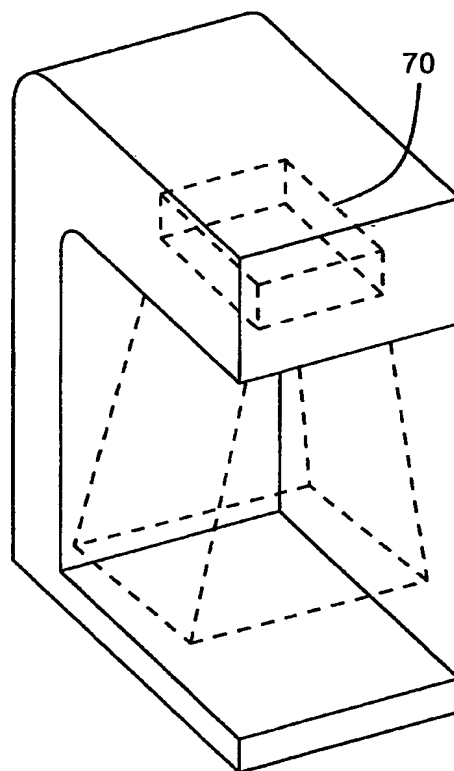


FIG. 5D